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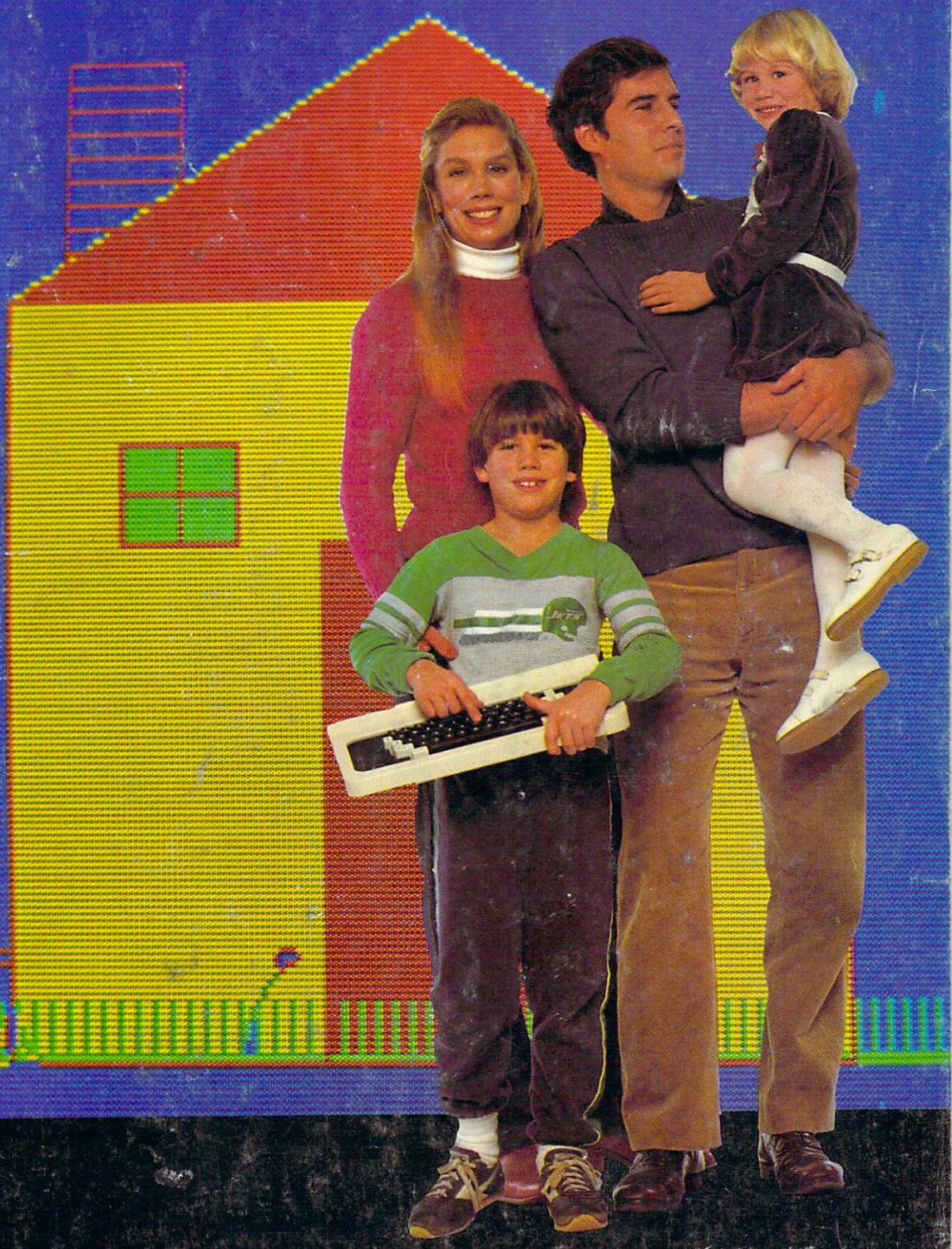
FEBRUARY
1984

VOLUME 2
NUMBER 2

FAMILY COMPUTING™

$1.95

Learning Logo Is a Family Affair



How to Make Sure Your Computer Is Safe

A Mom and Data-Base Management

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FAMILY COMPUTING™

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by Mard Naman

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They all have "turtle graphics," but some offer even more. Here's a quick comparison of the various features the different versions of Logo have to offer.

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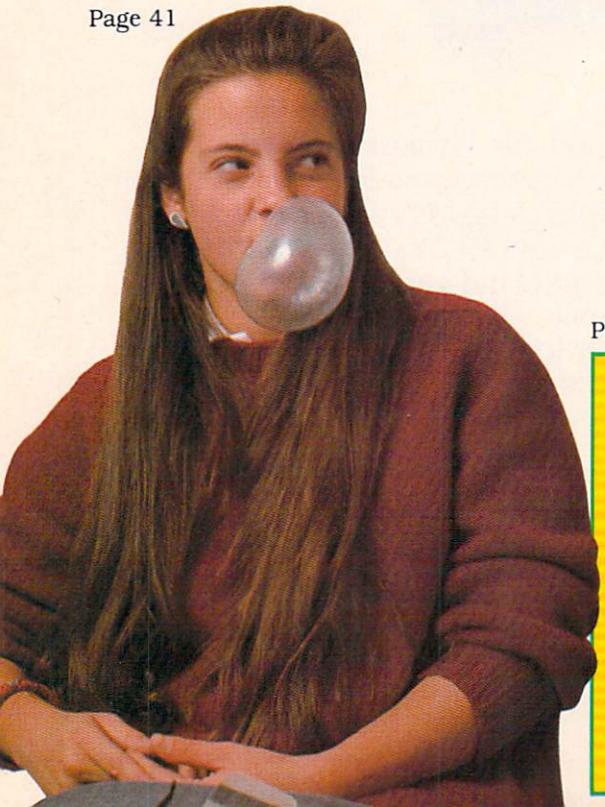

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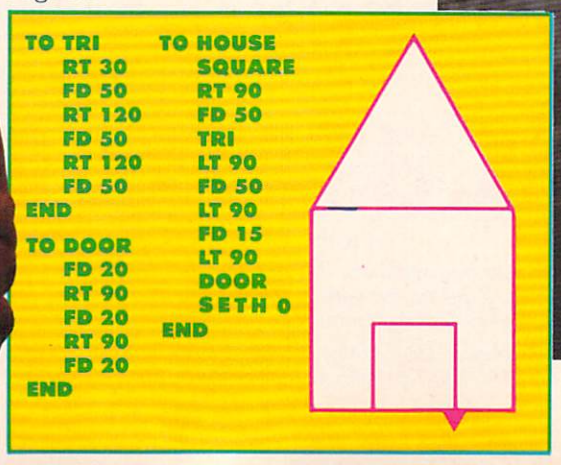

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   RT 120
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TO DOOR
   FD 20
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   FD 20
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   FD 20
END

TO HOUSE
   SQUARE
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   TRI
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   FD 15
   LT 90
   DOOR
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END
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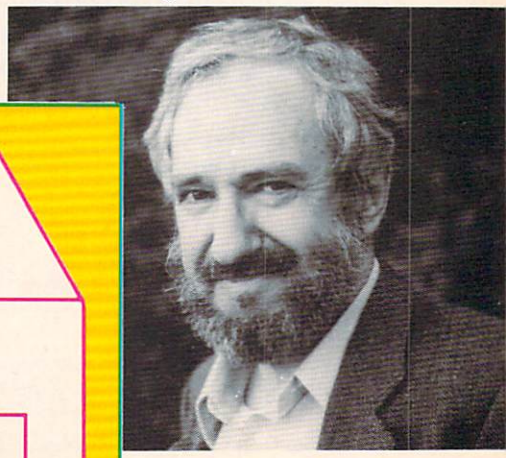

FEBRUARY
1984

PUBLISHED BY SCHOLASTIC INC.

VOLUME 2
NUMBER 2

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For enthusiasts of all levels.

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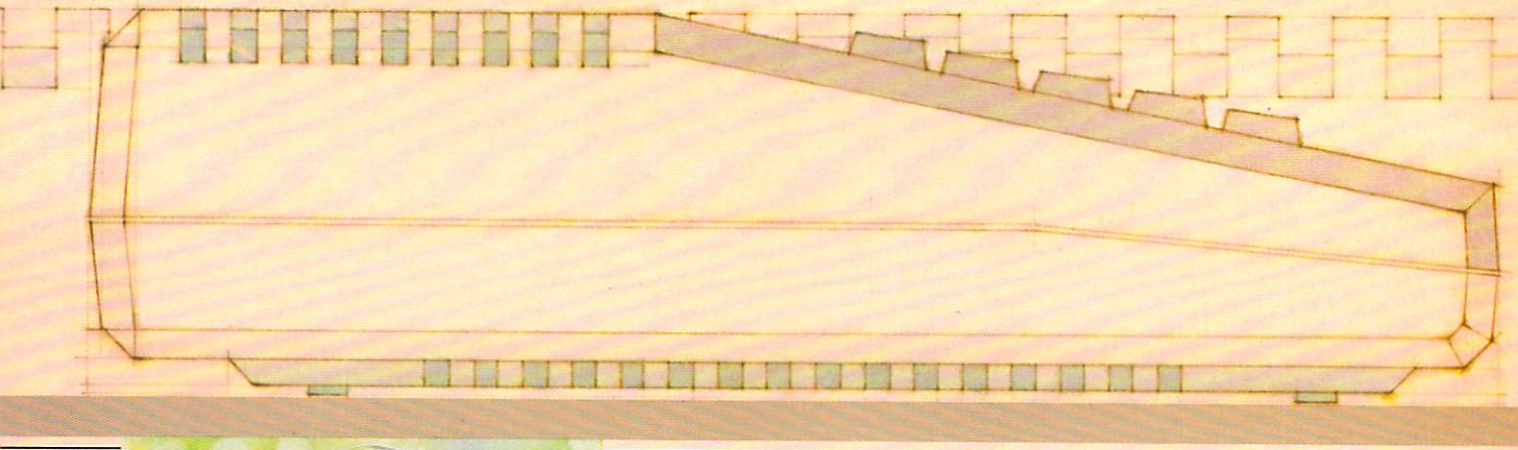

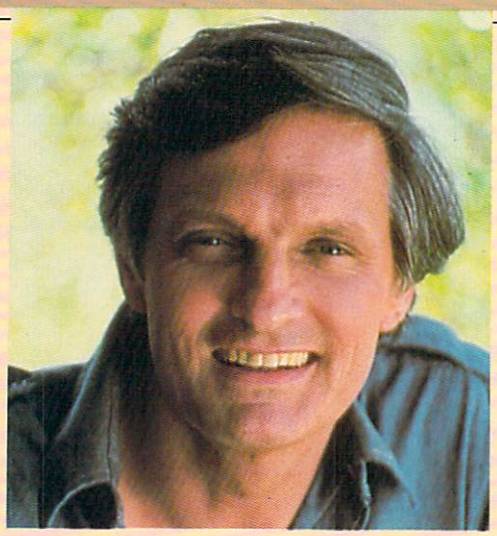

Computer enthusiast Alan Alda uses the ATARI 800XL Computer System. Alda reports: "It's going all the time!"

Introducing the Atari® XL Home Computers: We made them smart enough to know you're only human.

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The new ATARI XL Home Computers prove that you can blend state-of-the-art technology with good old fashioned friendliness. What's a friendly computer? For one thing, it's a computer that speaks your language. Both the new ATARI 600XL™ and the new ATARI 800XL™ Computers come with a built-in BASIC language that uses the same simple English you use to converse with the rest of the world.

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Every ATARI XL Computer comes with a HELP key. Something you won't find on any other home computer. New programs are becoming available that let you use this key for helpful "prompts" when you're unsure of what to do next. Press another special key and your ATARI XL automatically performs a self-diagnostic check—a feature that can save you a needless trip to one of our more than 1,000 ATARI Service℠ Centers.

The ATARI 600XL: It Gets Smarter As You Do.

With 16K of memory, the inexpensive ATARI 600XL can handle over a thousand programs: including education, home management, word processing and personal development. Like all ATARI Home Computers, it gives you 256 colors, four sound channels and Atari's unsurpassed graphics. But unlike a lot of other computers, the ATARI 600XL is ready to grow when you're ready to grow. Every ATARI XL Computer is fully compatible with every ATARI peripheral ("peripherals" are added on to expand what your computer can do).

ATARI peripherals include: a low-cost, letter-perfect printer for word processing. A telephone modem that lets you use your telephone to connect your computer to other computers thousands of miles away. A disk drive and a cassette recorder to store data. And Trak-Balls™ and joysticks to use with Atari's unequalled lineup of great arcade hits. An ATARI 600 XL Computer can be turned into a very brainy 64K computer at a very affordable price.

The ATARI 800XL: Power Enough For Over 2,000 Programs:

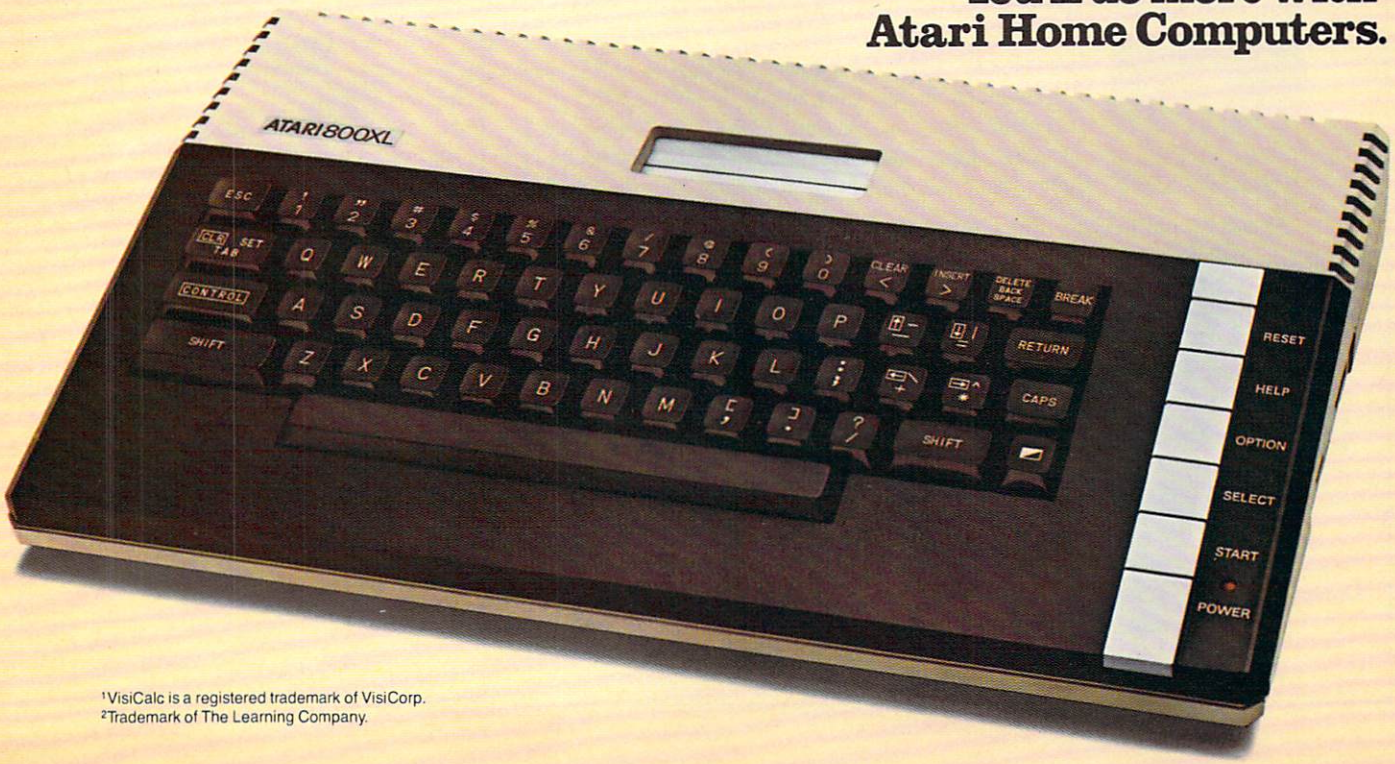
With 64K of built-in memory (as much as the more expensive Apple and IBM computers), the ATARI 800XL can take on any of over 2,000 software programs. That's five times as many as a Commodore 64.

There's VisiCalc®[1] for electronic spreadsheets—faster than the fastest accountant. The Home Filing Manager™ to help keep track of everything from medical records to phonograph records. Family Finances to keep up with your cash flow. Educational programs like "Juggles' Rainbow"[2] that helps preschoolers develop skills necessary for recognizing the alphabet. Even "An Invitation To Programming,™" for learning how to program.

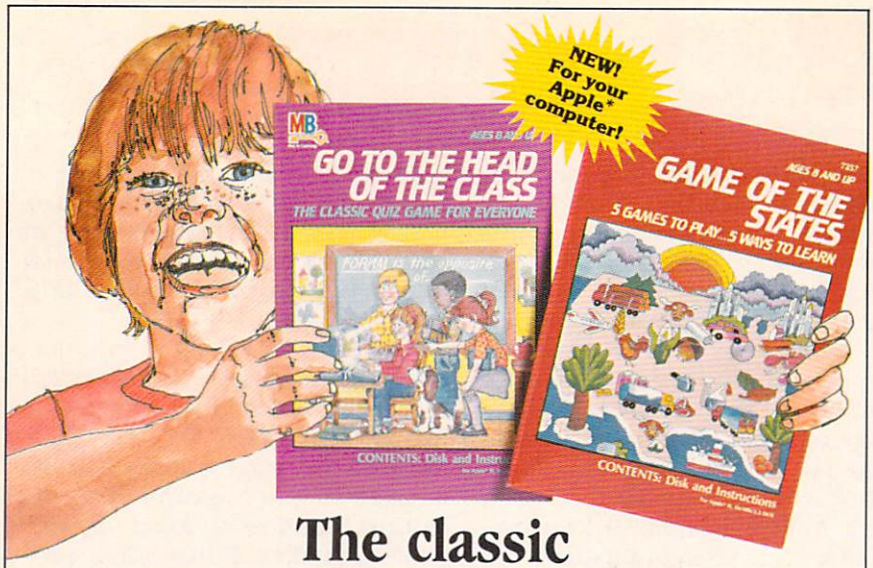
When You've Got Our Computer, You've Got Our Number.

If you ever find yourself stuck, or have any questions at all, just give us a call. 800-538-8543. (In California, 800-672-1404.) Feel free to talk it over. Because if there's anything friendlier than an ATARI Home Computer, it's the humans who make them so friendly.

You'll do more with Atari Home Computers.



[1]VisiCalc is a registered trademark of VisiCorp.
[2]Trademark of The Learning Company.



The classic Milton Bradley games you loved as a child are now computer games for the whole family!

Remember how much fun you had as a kid playing Go to the Head of the Class and Game of the States? They were so much fun you didn't realize you were learning at the same time!

Now, Milton Bradley is proud to announce that these ever-popular educational games have been formatted for use with Apple II, IIe home computers.

GO TO THE HEAD OF THE CLASS

This highly competitive general knowledge game is designed for ages 8 and up. Players advance from desk to desk by giving correct answers to over 300 questions on vocabulary, geography, math and history. Three levels of play are available — junior, senior, or graduate — so the whole family can play at once!

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How much do you know about the 50 states? This game gives you five ways to find out: Name the State; Name the Capital City; Abbreviation Game; Name the Neighbors; and Major Cities.

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Milton Bradley Educational Software.

MB Key to Learning ®

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by Eileen Shapiro

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- **Graphs**

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Commodore 64
IBM PC
Atari 800

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EDITOR'S NOTE

WHO'S THIS RELATIONSHIP WITH, ANYWAY?

There are people, I know, who rely solely upon themselves. I'm not one of them. All my life I've been "hooked" on other people. It's never been possible for me to go my own way and just not care. Instead, I've always found myself emboldened by the examples set for me by people I admire. Their independence, self-confidence, and courage gave rise to my own.

As a child I had my assortment of favorite relatives and neighbors, of course, mostly ones who inspired me to follow new dreams. At school there were teachers and later professors whose love for their subjects, for learning, and for life gave me a thirst for knowledge that extended far beyond the classroom. When I went to work, the same was true. I'd work tirelessly, striving always to do better, and it seemed effortless if my boss was someone I admired. These people made a difference in every aspect of my life.

A connection to people is at the heart of our goals for FAMILY COMPUTING. It brings us sheer pleasure to forge a new path in an industry that's been driven by machines. Detractors are out there, fighting to keep all discussions of computers centered on the machine. Putting the emphasis on people, some say, will never work. "A lousy idea," I've heard some state.

Committed to meeting the needs of our readers, we've forged ahead. Now the response is pouring in, and to open our mailbox is to find a daily batch of letters that say, "Thank you for FAMILY COMPUTING." These are our Valentines—any month they arrive. Other letters request information or help. We regard these as bills—a debt we owe our readers for the trust that is being placed in us.

We try to earn your trust in a number of ways: by publishing articles that help you make better use of your computer, by serving as your advocate when we review new products, by providing you with original programs for every holiday and season as well as year-long fun, and by keeping before us the goal of helping you to fit your computer into your everyday life.

Among the ways in which we're meeting these goals this issue is the commitment we're making in our Programmer section to continue to run TI programs every month for the forseeable future despite TI's announcement that they will no longer produce computers for the home market. And for the countless families who tell us that learning Logo is a top priority for them, we're running "Learning Logo Is a Family Affair" (p. 64). Most of the FAMILY COMPUTING staff has been moved by the story of Michela Alioto ("64 Inches of Courage," p. 41), and we think you'll find this extraordinary teenager equally inspiring.

We always want to do more and better for you, motivated in part by the energy and devotion of so many of our readers. Let us know how we can be more useful and valuable to you. M.R. Robinson, the founder of Scholastic, who died early in February of 1982, often reminded us that being invited into the lives of our readers is a privilege.

Claudia Cohl

CLAUDIA COHL
EDITOR-IN-CHIEF

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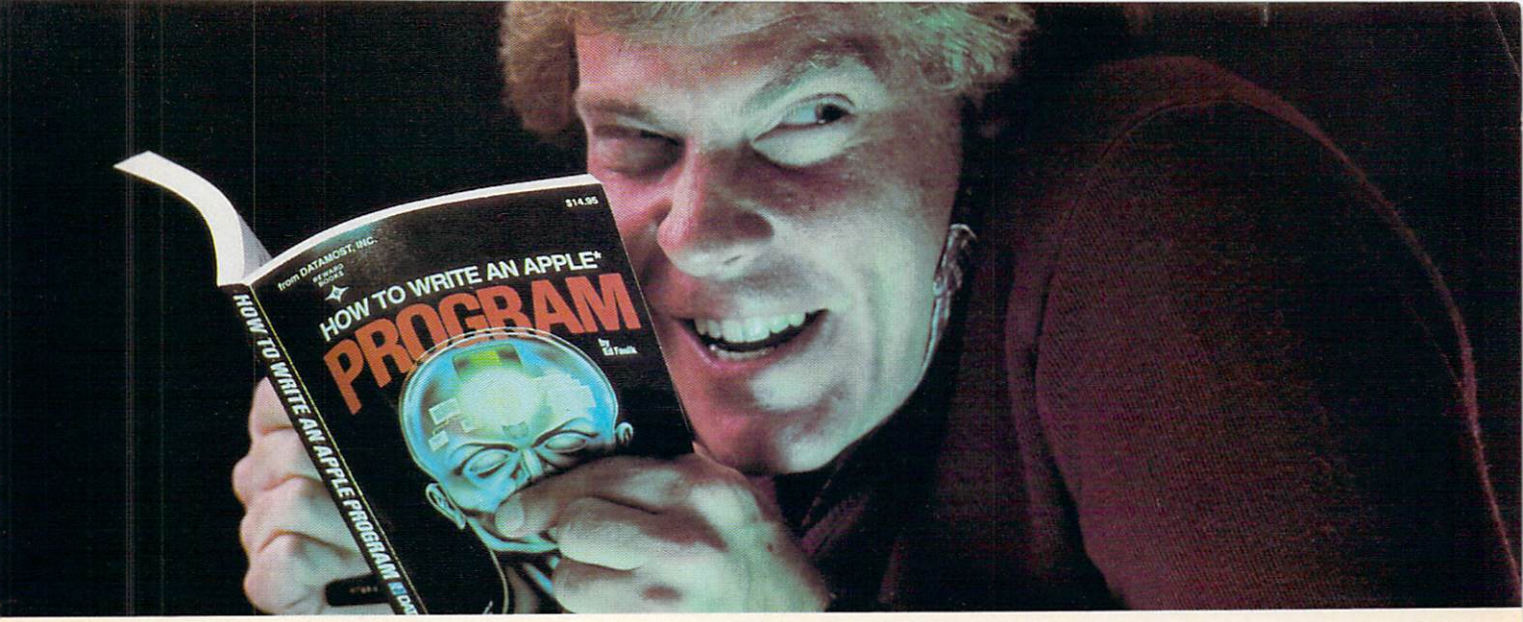

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LETTERS

READERS OFFER TRANSLATIONS

I read with interest the article on the *Home Heat Loss Calculator* program (Premier issue, p. 85). The TI-99/4A program worked fine on my sister's TI-99, but I am a TS 1000 owner, and I have noted the great majority of interesting programs are not for the TS 1000.

So, I decided to translate the *Heat Loss* program into Sinclair BASIC. The program runs fairly quickly and is serving this household in determining which options for weatherization we will pursue. The program was written on a TS 1000 with a 16K RAM expansion and recorded on a Sanyo ST-45 recorder. I hope you will want to share this translation with your readers who are TS 1000 owners.

VAUGHN R. MARTENS
Racine, WI

After reading your first issue, I like it. So far I have only one complaint: You have nothing for the TRS-80 PC-2. I have to admit that none of the other magazines do. But you claim to include what they do not. Please accommodate those of us who do not have a full-size computer. I altered one of your programs (*Future Age Calculator*) for my PC-2 so it would run. But, if I was a great programmer, I would not need your magazine.

WALLACE E. WILLIAMS
Interlaken, NY

EDITOR'S NOTE: *Your letter points out the need for us to be more specific about which models our programs run on. Among the TRS-80 machines, we run programs for Models I, III, 4, and the Color Computer—the most popular brands for family use. Unfortunately, your machine does not fit that category.*

Although FAMILY COMPUTING *would like to publish all reader-written program translations, it is impossible because of time and space limitations. For Timex users who would like a copy of the adapted program for Home Heat Loss, send a self-addressed, stamped envelope to Mr. Martens, 3504 Six Mile Rd., Racine, WI 53402. TRS-80 PC-2 users who would like a translation of the* Future Age Calculator *program, send a self-addressed, stamped envelope to Mr. Williams, RD #2, Box 253, Potter Rd., Interlaken, NY 14847.*

FAMILY COMPUTING *has not had the opportunity to test these programs properly; therefore, we cannot bear responsibility for any damage to your equipment that may result.*

DRACULA'S PROGRAM: A BAD BLOODLINE?

I was wondering to what extent the programs that appear in your magazine are tested before they are printed in each issue. I am specifically referring to the *Dracula's Family Tree* program in the October issue. I have attempted to run this program several times on a TI-99/4A, using the TI translation. Each time, I get an error statement that reads: INCORRECT STATEMENT IN LINE 210. I am getting thoroughly disgusted with trying to determine why the program won't run and have concluded that it is a programming error.

I would appreciate your verifying if the program is correct, or letting me know what is incorrect about line 210. Your assistance will be greatly appreciated, as you very well may save my sanity.

PAUL L. WILLIAMS
Ashland City, TN

EDITOR'S NOTE: *We test our programs extensively; unfortunately, we occasionally make errors. There was an error in the modification box for the Texas Instruments version of* Dracula's Family Tree. *We apologize for any inconvenience. The corrected version was printed in the December issue, page 143.*

A PEACH OF A PUMPKIN

Just completed your most colorful pumpkin on a C-64. Beautiful! Come the end of the month the monitor in the window should make quite an impression on the neighbors. For once the pumpkin won't end up in the street.

Between now and then I want to get a regular subscription to FAMILY COMPUTING, including the first issue and any subsequent issues until the computer-mechanical-process gets my name on your mailing list. I don't want to miss even a single edition.

In a world where new computer publications are appearing almost daily, yours is TOPS. Keep up the good work.

RUSSELL S. DECHSLIN
Spencer, IA

DESIGNING A DATA BASE

Just finished my first FAMILY COMPUTING. Super is about the best word.

I enjoyed your different programs. I had a few questions answered by studying these.

Do you have, or are you going to run, a program that designs a filing system? I teach, and am looking for a file program to store information with cross-reference and search capabilities. I would like to program one myself.

Thanks for a fine publication.

LARRY THOMAS
Hooks, TX

EDITOR'S NOTE: *We are featuring some examples of commercial data-base-management programs in this issue, page 78. Unfortunately, we have no stories scheduled on how to program your own data base.*

A PLEA FOR NO TREE

When my husband suggested we use your *Jack-O'-Lantern* (October issue) program instead of our traditional pumpkin carving, we all agreed it was a great idea. Our three-and-a-half-year-old, Kenneth, enjoys "carving" his own pumpkin by pushing RUN! But, please—in your Christmas issue, don't include a Christmas tree! My stepfather sells Christmas trees, and I'd be kicked out of the family if we didn't have a bushel of pine needles to clean up the first week of January! And, Kenny doesn't think we could fit enough gifts under your version.

MARGUERITE KISTLER
Perkasie, PA

EDITOR'S NOTE: *Sorry, it's too late; our* Christmas Tree *program appeared on page 110 of the December issue. We hope it was the "extra" tree and extra present we intended it to be.*

FAMILY COMPUTING *looks forward to letters from all our readers. Please direct your correspondence to: Letters to the Editor,* FAMILY COMPUTING, *730 Broadway, New York, NY 10003. Include your name, address, and phone number. We reserve the right to edit your letters for length and clarity.*

Enjoy a world of learning and leisure with the Sakata Model SC-100 Color CRT Monitor

Model SC-100 accepts a composite video signal; has a modern streamlined design; includes an audio speaker and an earphone jack for privacy of operation and is compatible with fine popular personal computers.

Your SAKATA monitor will enhance your picture comparable to the most expensive computers available.

Improve your education and increase your fun with SAKATA CRT DISPLAY MONITORS . . . . "We Promise Performance",..

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SAKATA CRT MONITORS are available wherever personal computers are sold or write for technical and illustrated literature and prices.

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Model SC-100 13" CRT
COMPOSITE COLOR
DISPLAY MONITOR

BEHIND THE SCREENS
PEOPLE, NEWS, AND TRENDS

EDITED BY JOHN WALLACE

All That's Gold Does Not Glitter

In the good old days (before 1975), when computers were very big and the price of precious metals was relatively small, computers were made with somewhat exotic materials. Gold, silver, platinum, and iridium were often used in sizable quantities as electrical conductors in the computer's circuitry. As a result, it's entirely conceivable that an old obsolete model may be literally "worth its weight in gold," or other precious or semi-precious metal. But don't run out to the nearest junk shop. Reclaiming the valuable material is not a simple task.

Professionals, however, are delighted with this "new wonderchild of the salvage business." And some old mainframe owners may have less trouble unloading their obsolete machines than they had initially anticipated. Last fall in South Windsor, Connecticut, for instance, town officials were trying to get rid of their old computer, an NCR-50. Inundated by calls from savvy salvagers, the officials realized their old model might merit a formal auction. The computer finally went to a family business, Ostrinsky, Inc. in Manchester, Connecticut, for the meager sum of $100. The Ostrinskys are specialists in electronic salvage, and competitor computer scrappers realized that without the technical knowledge they couldn't possibly mine for metal in the old machine.

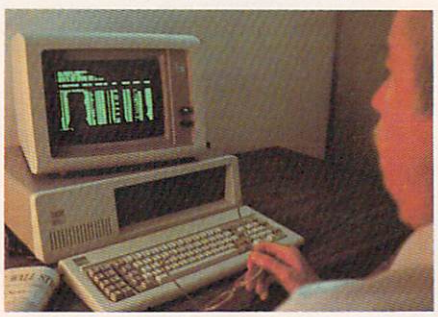
"The refining process is complicated," explains Bob Philibert of Bob's R.P. Recovery, Inc., in West Babylon, New York. Philibert went into the business when he realized just how lucrative computer and other high-technology refuse might be. "You have to take all of the printed circuit boards and wash them in certain chemicals—mush them, grind them, melt them, and strip them. There's a tremendous amount of labor involved. It's like taking salt, pepper, sugar, and spices, dumping them in a big pot, and trying to get the sugar back out."

—ROBIN RASKIN AND MARILYN MUELLER

The House Broker

Personal investors will now be able to have a ringside seat at home for the bull and bear battle that rages daily over the counter, on Wall Street and other stock exchanges. No longer will investors have to route their instructions to buy and sell stocks through brokers, or have to wait to the end of the month to get an itemized account of their portfolios. A San Francisco–based brokerage firm, C.D. Anderson and Company, has introduced an innovative personal computer trading and portfolio-management system, believed to be one of the first of its kind.

Desk Top Broker employs a combination communications and database software connected to a host computer linked directly to the American and New York Stock Exchanges, developed by a firm called Trade*Plus. It's available for a one-time fee of $300 to anyone with the appropriate hardware configuration—that is, a personal computer (computerized clients include owners of most popular brands) and a modem. Hooked up to the host computer via G.T.E.'s Telenet, the home investor can leave messages and instructions to buy and sell, transactions that will be conducted the next business day.



"I find being able to buy and sell via the computer very convenient," reports Keith Evans, a computer salesman from Boulder, Colorado, who's been his own broker for about six months. "I can keep track of the status of my portfolio and carry out transactions when I want. I usually do it before I leave in the morning."

According to company president and founder C. Derek Anderson, the *Desk Top Broker* could very well revolutionize the way small investors conduct their personal transactions. "There's no doubt about it, our ultimate goal is to completely eliminate the middleman for those who know about stocks and finances," he says. Anderson still makes a commission on transactions conducted electronically through his office.

As Anderson sees it, the personal computer is a natural as an investment tool. "With the personal computer, everyone knows they should have one, but no one knows just how useful it can really be. Home investing through personal computing is one way for the individual to secure more control over his or her financial future."

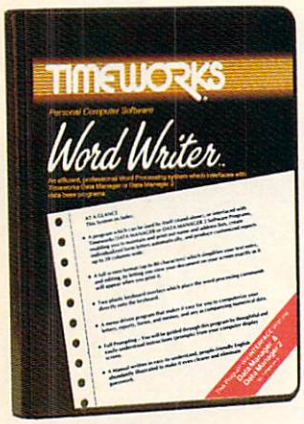
What's Black and White and Sits in the Attic?

A computer monitor, that's what. With the price of color TV sets dropping and their popularity increasing correspondingly, the old faithful black-and-white has fallen upon hard times. Why not dust it off, tune it up, and put it to good computer use? So advises the "Attic to Addict" campaign launched by Philips ECG, long-time supplier of electrical components, such as Sylvania picture tubes.

"With the growing interest in

ILLUSTRATION BY HOLLY KOWITT

IF YOU CAN FIND A BETTER WORD PROCESSOR OR DATA BASE SYSTEM WE'LL BUY IT FOR YOU.



Outrageous offer? Not really. For your Commodore 64, we're putting our money where our mouth is, because the Timeworks Word Writer and Timeworks Data Manager 2 are so complete—so extremely easy to use, we think nothing beats them at any price. (Our suggested retail prices are: $49.95 for Word Writer. $49.95 for Data Manager 2.)

Word Writer

This menu-driven system includes:

A program which can be used by itself (standalone), or interfaced with Timeworks' Data Manager or Data Manager 2, enabling you to maintain and print out name and address lists, create individualized form letters automatically, and produce customized reports up to 20 columns wide, which can be incorporated into any text produced by the Word Writer.

Two plastic keyboard overlays which place the word processing commands directly onto the keyboard.

A full screen format (up to 80 characters) which simplifies your text entry and editing.

All the essential features—plus some exclusive Timeworks extras—making this system completely functional for most home & business requirements.

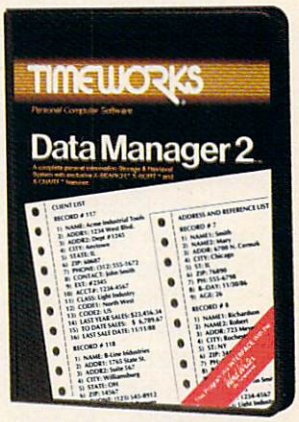
Data Manager 2

This system includes:

A menu-driven program that easily lets you store information on a wide variety of subjects—from general name and address lists, to research data. This program will also calculate and store any corresponding numerical data.

Quick access to important information. Items can be easily retrieved and printed by category, name, index code, date range, amount range, or any category of information stored in the system.

Timeworks exclusive X-Search,™ X-Sort™ and X-Chart™ features allow you to easily cross-search any of the categories. Or arrange your stored items in increasing or decreasing order, alphabetically, numerically or by date. Break down statistical information by up to ten indexed categories of your choice—and graphically review your results.



Arithmetic calculation of your mathematical data is possible, allowing you to perform Payroll calculation, cost estimates and more. Data Manager 2 also produces the Sum, Average and Standard Deviation of statistical data entered into the system, along with Frequency Charts.

When interfaced together, these programs:

Generate customized data reports, which can be incorporated into any written text produced.

Individually address and print form letters automatically.

Print your name and address file onto standard mailing labels.

Transfer and print text information onto labels and tags.

Calculated numerical data from column to column, giving these programs spread-sheet capabilities.

So, if you can find anything better, simply send us your Word Writer or your Data Manager 2, your paid receipt, and the name of the word writer or data base system you want. If it's available, we'll buy it for you.**

Now at your favorite dealer. Or contact Timeworks, Inc., P.O. Box 321, Deerfield, IL 60015. Phone 312-291-9200.

TIMEWORKS

SOFTWARE WITH SUBSTANCE.

**Now for the small print. Offer applies to Commodore only, with maximum suggested retail prices of $125.00 each for any exchanged program. Offer expires 45 days after date of your purchase.

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Challenge yo

Make beautiful music. Everyone loves music. And anyone who has ever hummed a tune can write one, now. Scarborough has taken the universal language of music and developed a software program that makes it fun and easy to write songs for budding composers of any age.

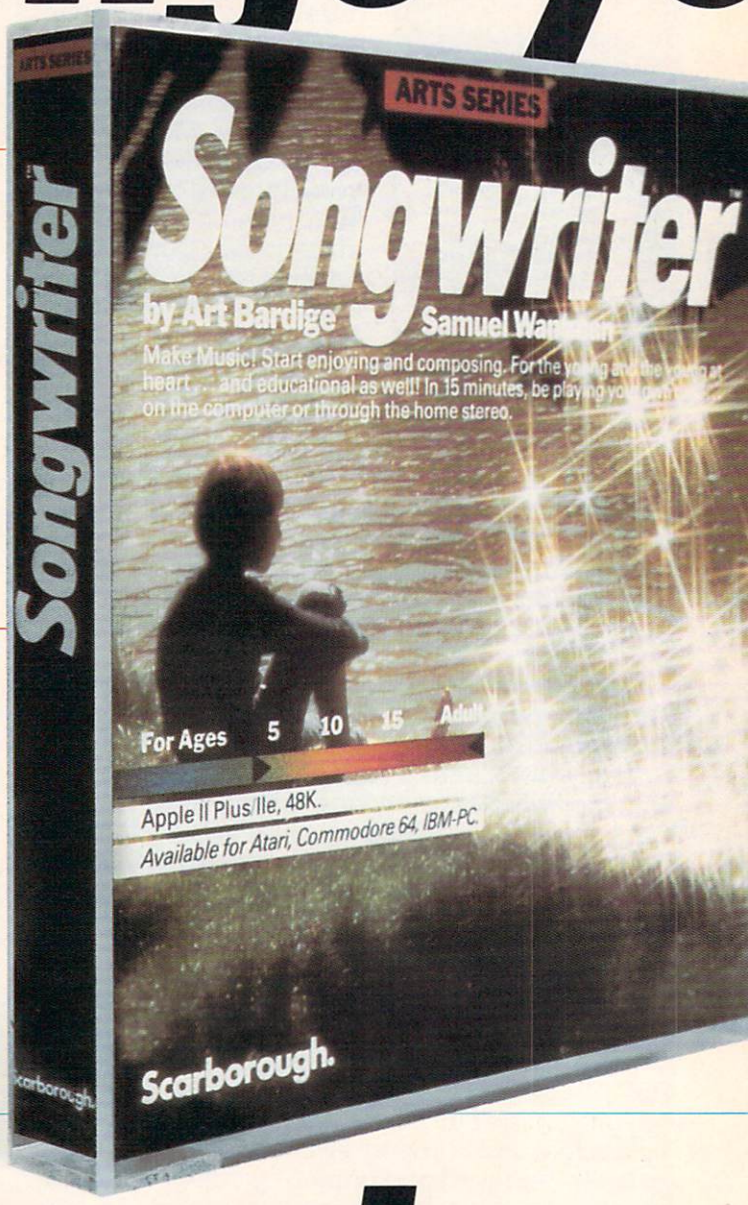
Even those who don't recognize a single note can be composing songs in 15 minutes. Simulated piano roll graphics and on-screen commands serve as a guide every step of the way — from scales and rhythm to more complex musical forms and theory.

With Songwriter, composing songs is as simple as "do-re-mi." Write a song, change, delete or add a note, change tempo and teach the computer to repeat musical motifs. Even save compositions to play back through the computer or your home stereo. For added fun, there is also a library of 28 popular songs to listen to and experiment with, as well as a series of educational activities for adults and children.

Songwriter is like a word processor for music that will bring the whole family back to the computer, again and again — because Songwriter encourages experimentation and makes the whole process fun. Isn't that why you bought a personal computer in the first place?

Every kid has a song in his heart. (So does the "kid" in every parent!) Help yours express it with Songwriter.

Available for Apple,® Atari,® Commodore 64™ and IBM-PC® $39.95



The Scarboro

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ur creativity.

Be quick on the draw. PictureWriter is magic! Create any shape or pattern, instantly. Fill areas with glowing colors and even hear pictures set to music.

PictureWriter brings out the artist in anyone. With this program, your child can create his or her own picture gallery and watch the computer redraw the pictures like magic on the screen. PictureWriter also includes a library of masterpieces by other "picture writers" that can be colored, edited and redrawn.

Like all Scarborough programs, PictureWriter encourages experimentation and continually challenges the child to explore new avenues. And all the while, PictureWriter subtly develops the child's familiarity with the fundamentals of step by step computer programming.

Getting started is simple. The built-in tutorial zips the artist into the program quickly and keeps him or her creatively occupied for hours.

The possibilities are endless with PictureWriter. In fact, children find it so captivating that parents will probably want to doodle with it, too. And why not?

You can't stay an adult forever.

Available for Apple® $39.95
(Soon, Atari®)

ough System.

home computers and video games, one family television set isn't enough. Why not take out the old sets and repair them economically?" says Donald Emden, sales promotion manager for Philips. He explains that the campaign was created to let people know that reviving the old black-and-white TV set is cost-effective for families, and lucrative for parts manufacturers and retailers as well. "It's particularly helpful on weekends and during football season," Emden says.

The computer age has given the old boob tube a new lease on life.

—ROBIN RASKIN

Softening Software Prices

While the cost of personal computer hardware has plummeted over the past several years, the software crucial to its working wonders has not taken a similar dive. At least not yet.

Recently, however, at least two software companies have cut prices, and others are offering a number of "buyer incentives" such as rebates and "two-for-one" offers. Early signs of an impending price drop came last summer at a major computer trade show, the Consumer Electronics Show in Chicago. Commodore announced that it planned to dominate the software market by pursuing the same price-slashing tactics that had put it in the forefront of the personal computer market. Company executives predicted that prices would drop to $9.95. Meanwhile, other manufacturers of games and educational software geared to the home market nervously reexamined their prices, most of which were set generally in the $25 to $35 range.

Some companies have lowered their prices a bit. Others, like Epyx, makers of popular adventure/action games, are playing with a flexible system. They no longer set a suggested retail price. Instead, they encourage the consumer to make the rounds and select the best buy.

Of course, in order for consumers to get more for their software budget, retailers have to follow suit with price cuts, a measure they're reluctant to take. Many believe there is more money to be made off software markups than hardware margins. (Personal computers are sometimes sold for just dollars over the wholesale cost.)

"There's no reason that quality software can't be selling for less than it generally is," says Dave Albert, marketing manager for Penguin Software, a manufacturer of games and utility programs for Apple, Atari, and Commodore 64 personal computers. Penguin dropped the price of its disk-format games from $29.95 to $19.95 almost a year ago. Within a month its business nearly doubled.

Epyx Marketing Coordinator Maria Orosz disagrees with this rosy view. "There has been a trend to drop prices, but it has been mainly closeout stock (software either about to be or currently discontinued)," she says. "The trend won't continue."

Retail and wholesale skepticism notwithstanding, it's safe to say that prices may dip somewhat. As the number of personal computers in use at home increases (only four percent of U.S. families have one), software manufacturers will be able to sell greater volumes of their wares, which should drive prices further down.

Of course, the $24,000 question is: How far down can they go?

—KEN COACH

Computer Reliquary

An ancestor of today's personal computer, the Whirlwind, in an exhibit at the Computer Museum.

Classic computers never die. They just retire to The Computer Museum in Marlboro, Massachusetts. The only museum of its kind in the world, it is dedicated to "preserving the history of computing to enhance people's understanding of the present and future of technology, as well as its past," according to Museum Director Gwen Bell. Museum exhibits, lectures, and publications chronicle the computer's history—from the abacus to the present-day computer chip.

The museum is home to dated, but significant, dinosaurs—landmarks in the various stages of computer technology like the Whirlwind, MIT's enormous computer developed in the 1950s; and Shakey, one of the earliest artificial-intelligence robots. Seasonal programs offer lectures by such luminaries as Grace Hopper, one of the designers of the programming language, COBOL.

Founded in 1979 by Digital Equipment Corporation, one of the largest computer manufacturers in the country, the museum has since become an independent, nonprofit institution. Next summer, it relocates to Boston, where it will expand its archives and exhibition facilities.

—ROBIN RASKIN

Comp Lit

Tired of dog-earing favorite novels, flipping through worn-out paperbacks in search of that quotation on the tip of your tongue? Computerized classics may be the answer, if the pioneering work of individuals like University of Southern California Professor Robert Dilligan becomes popularly accepted. Since 1949, scholars have been using computers to record and document great works of literature. IBM and the Vatican teamed up that year to sponsor the first project, in which data processors keypunched the complete works of St. Thomas Aquinas.

On-line literature can be analyzed and studied scientifically for stylistic consistency, elements that indicate influence from other authors, and other features—processes that ordinarily take hours of page-turning and note-taking. One of Dilligan's students input Milton's works, marking 40 features per line, which could then be retrieved and cross-referenced for thorough, painstaking literary analysis. According to Joseph Rabin, a professor at Queens College in New York and editor of a newsletter devoted to on-line literature, *Computers and the Humanities*, the key to the profitability and popularity of computerized literature lies in the use of data-base management programs that organize and sort through the the works on file. He says that right now, the need for literature on software for personal computers doesn't exist. "Before anybody's going to put whole texts on floppies, you've got to be darn sure the world wants to use it."

If you've got a good bite-sized piece of computer-related news involving people, trends, or innovations, let's hear it. We will pay $25 for each item we publish. Write to Behind the Screens, *c/o* FAMILY COMPUTING, *730 Broadway, NY, NY 10003.*

It's still around if you know where to look.

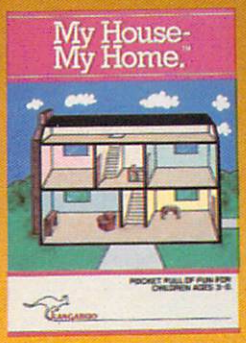
We are Kangaroo™ Inc., dedicated to just plain fun for kids 3 to 8 years old.

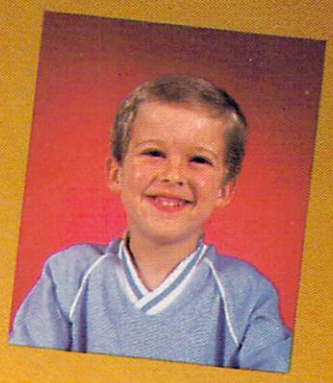
Jeepers Creatures™ - 30 basic animals with interchangeable heads, torsos, and legs or tails. Create an owligator or an octo-catfish or one of over 26,000 funny colorful combinations in this goofy collection of mixed up animals.

My House-My Home™ - Let's move into the house on Somewhere Street. It's ready for furnishing and family. Oops, you put the kitchen sink in the bedroom and Aunt Nellie's bed in the kitchen. That's silly.

Jeepers Creatures and My House-My Home have no winners or losers, no right or wrong answers, no high scores to beat, just hundreds of hours of creative play.

Give your child's imagination a boost with Kangaroo games designed for Apple and Atari computers.





Jeepers Creatures and My House-My Home are each available for $34.95 at your software dealer or from Kangaroo, Inc., 332 South Michigan Ave. Suite 700, Chicago, IL 60604, (312) 987-9050. Visa, MasterCard and personal checks accepted.

KANGAROO™ ***For a pocket full of fun.***

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What ever happened to just plain fun?

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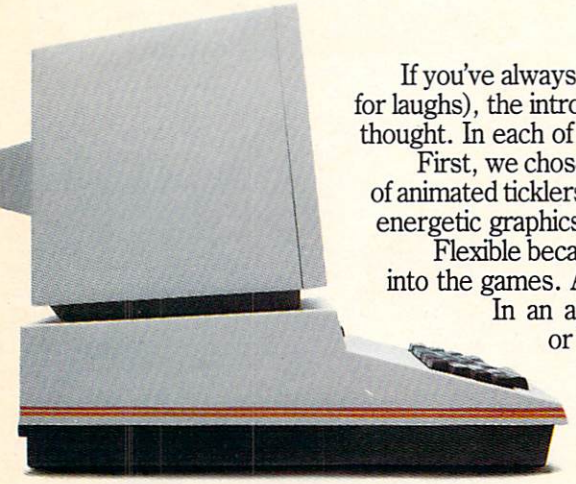
READER'S DIGEST INTRODUCES SOFTWARE GOOD ENOUGH TO GO OUT AND BUY A COMPUTER FOR.



If you've always thought of a computer as an expensive toy (or if the one you own now is used for laughs), the introduction of Reader's Digest Software™ games will give you pause for a lot more thought. In each of our programs we have done something quite unique.

First, we chose specific educational objectives. Then we created the games—a terrific series of animated ticklers to satisfy the most devoted computer buffs. And finally, we designed colorful, energetic graphics, in each case with a flexible format.

Flexible because most of our programs leave room for players to substitute their own ideas into the games. And the others never play the same way twice.

In an age when a lot of software is either too heavy-handed for much repetition or too frivolous to be taken seriously, Reader's Digest Software has broken fresh ground by striking an easy balance. Between a good learning experience and a good time.

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READER'S DIGEST

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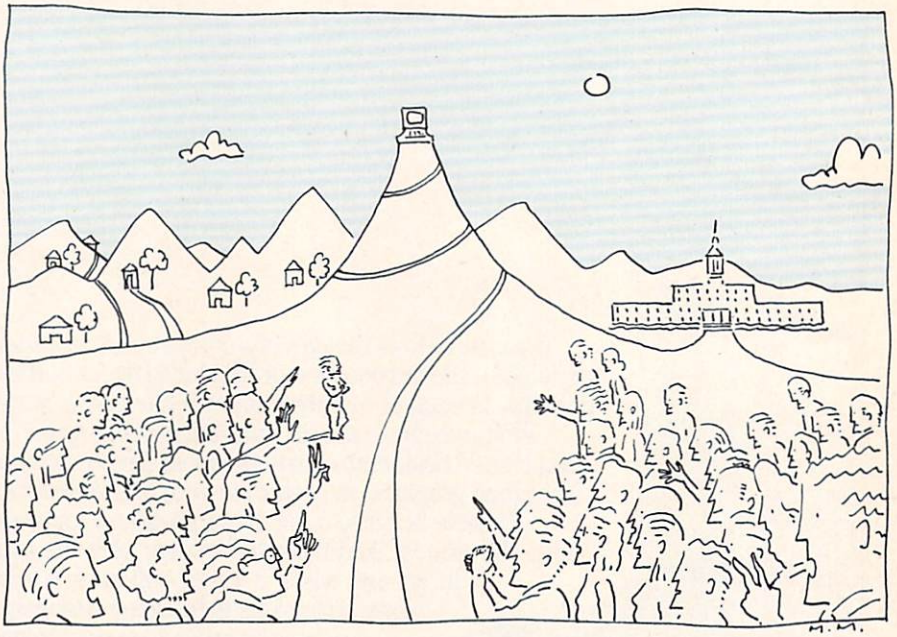
HOME-SCHOOL CONNECTION

THE COURSE OF PARENT INVOLVEMENT CAN RUN SMOOTH

BY BETSY BYRNE



All across America something exciting is happening—a new tool is finding its way into the classroom. Not only is the computer dramatically changing the way teachers teach and kids learn, but it's also transforming the way many parents participate in the educational process. In a lot of cases, the computer in the classroom is the fruit of months of concentrated effort on the part of both parents and teachers. To be sure, many such efforts have been successful, with computer labs and classes springing up all over the nation. The parent-teacher marriage, however, is not without its share of ups and downs.

It's a little bit like true love, in more ways than one. No one said its course would run smooth.

If you're involved already, or if you're thinking about getting involved, you may encounter some problems. Chances are they'll be as numerous and varied as the ways in which a computer can be introduced into a school system. If there's a controversy, it will likely fall into one of three categories, and is caused by one major problem: communication breakdown.

TURF: GOOD WILL IS NOT ENOUGH

The question of who should have responsibility for what is the first and last misunderstanding that could finish off a computer program even before it gets started. Certainly, disagreement over parent-teacher responsibilities is not unique to the introduction of computers in schools. It's always been tough to define either party's turf.

And although good intentions are always an important ingredient in a successful parent-teacher relationship, unfortunately, good will is not enough. Whether you're a parent or a teacher, or both, you know full well you have the best intentions for your child. A frequent complaint of both parties is: "They don't understand our point of view!" Each side believes that the other may not have the true interest of the child at heart. Somes teachers think parents are pushing a fad; some parents are absolutely sure teachers feel threatened by computers.

It's rarely quite so cut-and-dry, and feelings aren't always antagonistic, but it's important for all parties to recognize one another's interests and attempt to be responsive.

THE COMPUTER PURCHASE

Another controversial question is the brand of computer to purchase for the school. You can be fairly sure, unless you're fortunate enough to have worked out a loan or purchase agreement with a reliable computer company, that there won't be enough money to go around. You can be equally sure that a number of the parent-teacher participants will be absolutely set on getting the same type of computer that they use at home or in the office.

In one Michigan school district, the debate about which computer to purchase focused on quality vs. quantity. The high-power advocates were parents and teachers who believed it was most important to give students access to one of the most powerful personal computers on the market. The low-end champions were concerned that every student be given as much time on the machines as possible.

"Even if unlimited funds are available, it is unrealistic to think that one brand of micro will serve all the K through 12 grades," a teacher from that district says. "When all the shouting is done, and the true needs of the school are assessed, you may end up purchasing four or five different brands of micro." One way to avoid "all the shouting" and to keep the ball rolling on the computer purchase is to be methodical. Another

BETSY BYRNE *frequently reviews software for* FAMILY COMPUTING. *She and her husband have four kids, and are involved in their school district's computer program, where they have learned the meaning of turf and tension.*

ILLUSTRATION BY MONA MARK

THE BEST REASON FOR HAVING A HOME COMPUTER.

Your children...to give them a headstart with computers. That's why we created the Early Games series for them. We're educators as well as computer specialists. We create games that teach children important skills.

There are five programs in the Early Games series. **Early Games for Young Children** is a set of nine entertaining activities for children 2½ to 6. They can work with numbers and letters and create colorful pictures. **Matchmaker** uses shapes, sizes, directions and colors to help children develop reading readiness skills. Children ages 5 to 12 can learn to play melodies with Early Games **Music. Piece of Cake** turns math problems into, well, a piece of cake. And **Fraction Factory** takes the work out of fractions.

Early Games feature multiple activities, easy to use picture menus, and colorful graphics. The games are fun, children love to play them! That's why they learn from them.

And that's the best reason for having a home computer.

For the name of your nearest dealer call 800-328-1223

CSI counterpoint software, inc.
4005 west sixty-fifth street • minneapolis, mn 55435
(612) 926-7888 • (800) 328-1223

teacher says, "If a person is certain that his or her favorite brand is not being given the consideration it deserves, all the pertinent information about the computer should be gathered, demonstrating why that particular brand should be considered."

In Michigan, the decision was finally made to purchase a variety of different brands. The parent-teacher committee had Commodore PETs donated to the mid-level schools; they purchased less expensive computers with good graphic and music capabilities for the younger students, and a few IBM PCs for the high school level.

PUTTING IT TO USE

Now that you've got the computer, what do you do with it? The question is the third and final category into which most parent-teacher conflict falls. Just as there are never enough dollars to go around, there are never enough computers to go around. Who are the students with priority? Do you put it to the service of kids with learning disabilities, or do you let the gifted kids have first dibs? Do you want your youngest getting comfortable with it, or your oldest to get vocational training on it? And what about programs? Who decides whether you'll spring for straight drill-and-practice or innovative educational games? Who determines which word-processing program is best—and how much to spend for it?

A school administrator in Michigan recommends that teachers be the first to get a turn on the computer. "We must get our teachers trained before we worry about anything else," she says. Once teachers are familiar and comfortable with the teaching potential of the machine, they are better qualified to decide where the computer can be put to best advantage. She used the local community education programs, classes, and workshops conducted for adults and children alike, to teach teachers about the ins and outs of computing in education, and to provide exposure to students who want time on the newly acquired equipment.

On top of all this is the language question. Learning to program a simple language on the computer is an enriching experience for kids—participants in parent-teacher meetings agree on that much. Negotiations tend to fall apart, however, over the issue of which kind to teach. The usual choices are Logo and BASIC, both being fairly widespread in use, and very easy to learn.

SOLUTIONS

One consultant, who has worked extensively putting computers into schools, suggests printing a newsletter featuring regular updates on the progress of computer programs: who is using them and in what ways. It might help cut down on the communication gap, which can leave parents and teachers feeling mutually suspicious and insecure. "Include plenty of questionnaires for parents on computer subjects," she advises. "This way, parents and teachers can voice their opinions *en masse*."

Many times, expertise is exactly what the school district is looking for. "Don't hide your light under a bushel," she says. "If you have ideas, opinions, or expertise, get in touch with someone. Almost every district I have been in contact with not only welcomes suggestions, but has someone on the staff whose job it is to coordinate them."

Innovative projects or special events that involve members of the parent and teacher communities are especially useful ways of defraying some of the tension. Teachers and students in one Albuquerque high school put together a videotape that they showed on the local cable channel. It showed how they were putting the computer to use in their classes and after-school activities. And, most important, it invited others—parents and members of the community—to join in and contribute to the project.

A PROCESS OF GIVE AND TAKE

Getting your school computerized is not an easy process, by any means. The dark side of the home-school connection is just a bundle of fears and prejudices—and much can be overcome with heavy doses of perseverance, respect, and innovation. If parents and teachers learn to work together, the marriage won't end, even when the schools are computerized. FC

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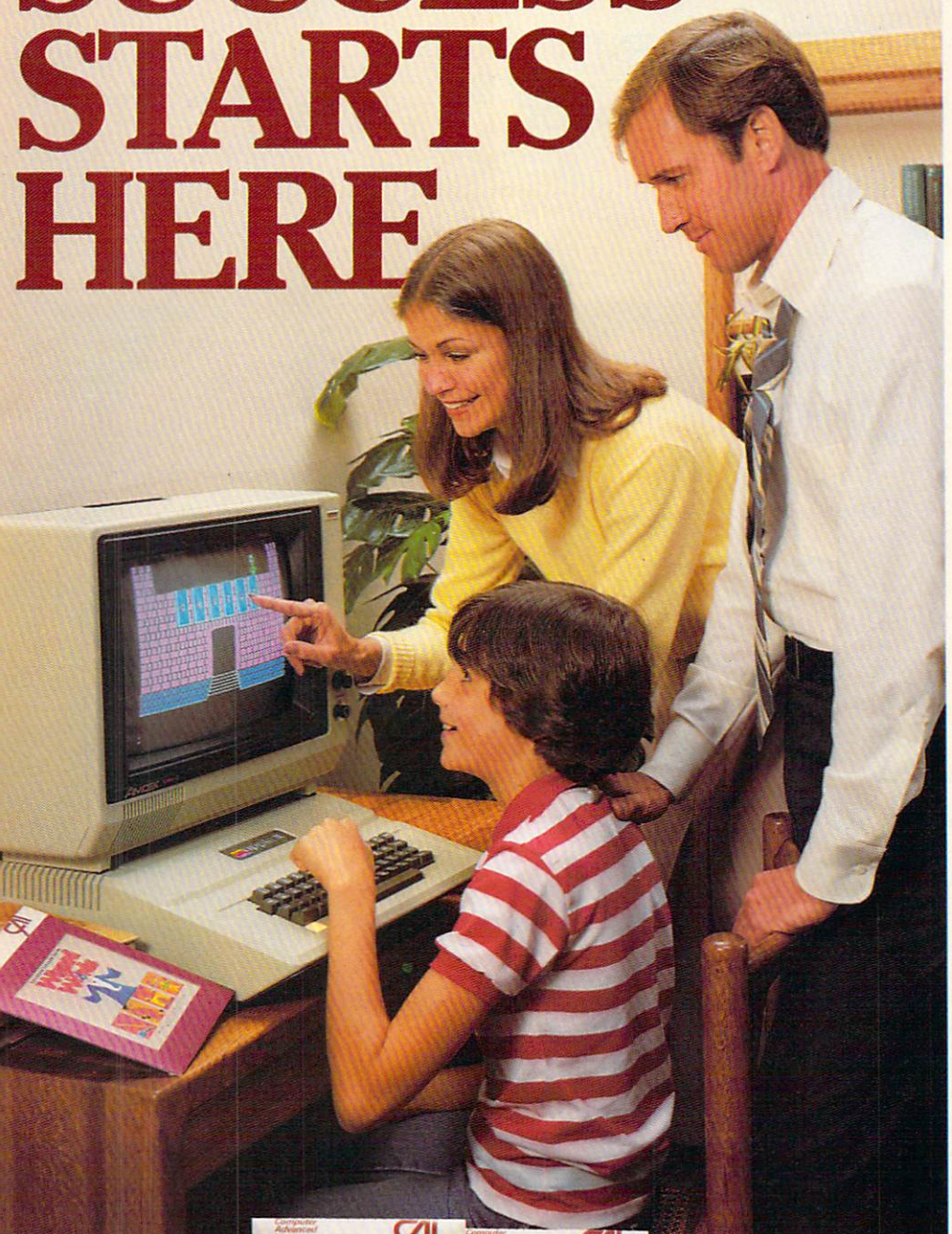

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GAMES

A NEW KIND OF ENTERTAINMENT
Don Bluth and Interactive Animation

BY JAMES DELSON

Dexter fires his gun in a scene from *Space Ace*, Don Bluth's latest animated laserdisk arcade game, programmed by a company called RDI and manufactured by Cinematronics.

For years now, arcade-game makers have dreamt about employing full-scale animation in video games. The visuals in games we know for the personal computer and arcade parlor usually aren't as fluid or detailed as we'd like them to be. But the course of video and arcade games changed last July with the introduction of *Dragon's Lair*, the first fully animated arcade game on laserdisk.

Dragon's Lair chronicles Dirk the Daring's search for the fair Princess Daphne, imprisoned in a huge castle. You're the knight himself, venturing through the castle, encountering obstacles and enemies in each room. Fend off crypt creeps or giddy goons. Leap over false floors, trapdoors, and treacherous chasms. Use controls to travel in one of four directions, and fight with your weapons at the appropriate moment. With every choice you make, you either continue your journey deeper into the castle toward the dragon's lair and the imprisoned maiden or meet an untimely, and more often than not, grisly end. (Parents may want to watch for this—protagonists and demons alike are frequently burned alive, turned to ashes, hacked to pieces, or impaled with weaponry.)

JAMES DELSON *is* FAMILY COMPUTING*'s games critic. Next month he'll be comparing the two dominant genres of computer games: the arcade game and the adventure.*

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Laserdisk technology has ushered in a totally new kind of computer-game experience. Instead of merely driving police cars or piloting Pac-Men around the screen, you're controlling fantasy heroes and heroines as vivid and fun to watch as any in the great Disney pictures.

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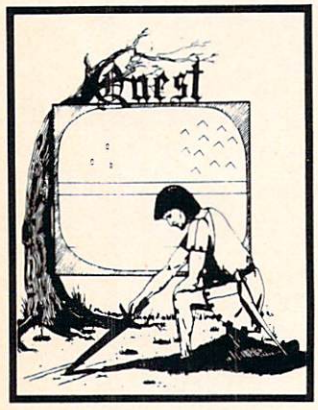

QUEST - A different kind of Graphic Adventure, it is played on a computer generated mape of Alesia. You'll have to build an army and feed them through combat, bargaining, exploration of ruins and temples, and outright banditry! Takes 2 - 5 hours to play and is different each time.

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Available On: TRS80C 16K, CMD64

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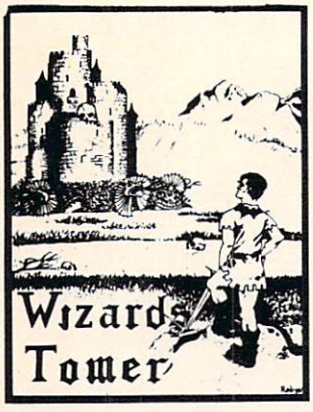

WIZARDS TOWER - A fantasy game played on a map of forests and dungeons - with dragons and wizards to kill. Similar to QUEST and fun for adults, but a little simpler and playable for the younger set (8 - 60).

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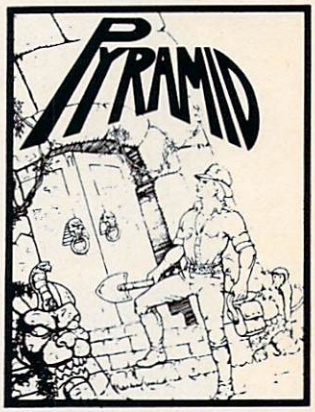

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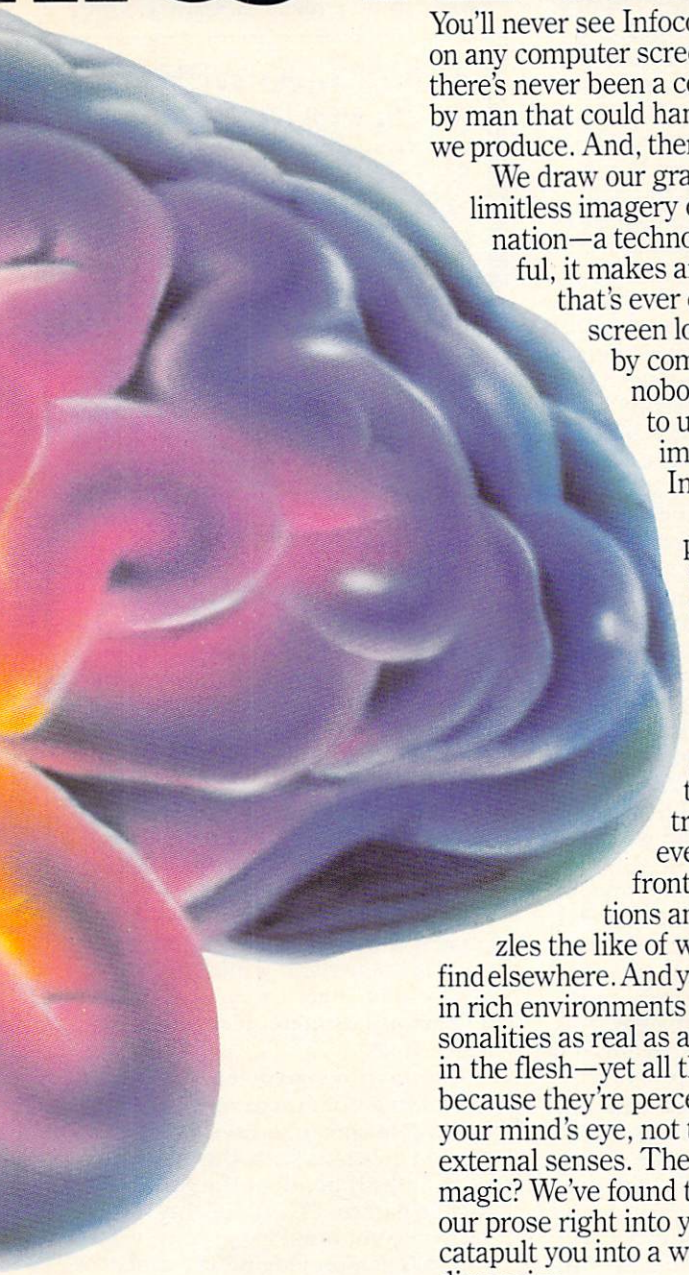

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scooting magically across the disk's surface. Hooked up to a computer, the laserdisk provides for the possibility of truly animated interaction.

Produced for $3 million, *Dragon's Lair* has already made well over $24 million, with another $18 million in back orders. Of course, as with all similarly successful gaming ventures, plans are already under way to develop the technology to introduce *Dragon's Lair* into the home. Coleco, makers of the celebrated new ADAM computer, has purchased rights to the game for $2 million. This year they'll be trying to come up with some feasible laserdisk version priced for the home market.

A DISNEY RENEGADE HITS THE ARCADE

Don Bluth is one of the primary moving forces behind *Dragon's Lair*. A world-renowned animator, whose impressive list of credits includes *Sleeping Beauty*, *Winnie the Pooh*, and *Robin Hood*, Don Bluth caused something of a stir when he left Disney studios to form his own team of creators in 1979. His first independent feature-length film, *The Secret of Nimh*, was expensive, a critical success, but a box-office bomb. *Dragon's Lair* was just what his career needed. (In 1983 it netted more money than most of the movies that came out of Hollywood.)

> IT'S NOT REALLY AN ARCADE AND IT'S NOT REALLY A MOVIE, IT'S SOMEWHERE IN BETWEEN.

"It has spurred the rest of the laserdisk industry," says Bluth. "Japanese companies are putting more than $150 million into players, and the big game manufacturers over here—Bally, Atari, and Gottlieb—will get into this market in order to stay competitive." Although Bluth still remains the dominant force in arcade animation, a number of other companies have announced the development of as many as 10 other arcade games that will employ laserdisk technology. With increased competition and better technology, Bluth suspects that the exorbitant prices for the disks and equipment will diminish, resulting in the faster introduction of these incredible devices into homes, schools, and libraries.

ANIMATED HEROISM

Space Ace is Bluth's newest contribution to the field. Like *Dragon's Lair*, it's a rescue story in the great classical tradition. The hero, named Dexter, once a great space cowboy, has been transformed (zapped by "infantile rays") into a little boy, his girlfriend kidnapped by a hostile alien. "The game is structured so that as you play the game as Dexter, the kid, if you get enough points, there's a moment when you can push the weapon button and make the screen go red. Sirens blair. You energize and turn back into the space hero, Ace," Bluth explains. "At that point you have a fork point (in laserdisk terminology, this refers to the point at which you make a decision or movement that sends you down one or another track of the disk). You either go back to Dexter or remain Ace (for higher points at higher risk) and continue the adventure trying to rescue your lady."

I visited the animator's offices in Los Angeles late last year. In a lobby already crowded with arcade consoles waiting to be shipped, a couple of Bluth's artists hunched over their painting tables coloring animation cells, some friends and I spent three hours playing the *Dragon's Lair* game set up for visitors. Even with coaching from one of Bluth's cameramen, none of us could get beyond 38,000 points—in a game that rolls up to 350,000 on the first run alone!

My fellow lair-goers and I agreed: The key to one's progress is remembering the correct step at each fork point in the game. The right move takes you further into the game. A wrong move and you're devoured by nasty "acid creatures," impaled by furious warriors, or faced with some such grisly demise. Some gamers can proceed by spotting the clues that flash on the screen, "if your eyes are fast enough to pick them up." There is a major drawback to *Dragon's Lair:* In order for the animation to work, you're obliged to follow a set path written into the program. You must execute each step at precisely the right moment. This means the game is either outrageously frustrating or (when you have mastered the right steps) repetitive. Of course—the animation is what makes the magic.

Bluth's games are worlds apart from traditional arcade games. The colorful cast of characters that make up *Dragon's Lair* and *Space Ace* is a far cry from the hordes of abstract gobbling Pac-Men, or legions of invading space raiders that assail the average arcade enthusiast. The adventures take place in settings that

> IDENTIFYING WITH WHAT YOU'RE PLAYING ON SCREEN IS A DIFFERENT KIND OF ENTERTAINMENT.

are fantastically rich and lush and extraordinarily detailed.

Bluth says that the whole experience invites an unusual sort of identification for the participant. "The process of identifying with what you're playing with on screen is a different kind of entertainment," Bluth comments. "It's not really an arcade and it's not really a movie. It's somewhere in between."

It's not unusual to see a *Dragon's Lair* console surrounded by several avid Dirk fans. "There was an arcade owner in Berkeley who saw 20 people lining up to play *Dragon's Lair*," Bluth says. "They couldn't all see the screen, so he placed one screen on top of the other for the rest of the viewers. Next, he put a red carpet bounded by a red velvet rope leading up to the console. Players would approach the machine along the carpet and try their hand while the audience would cheer them on. This isn't a game atmosphere, it's a theatrical experience.

"Correctly constructed, arcades will have a little room off to the side with a big screen, so several people can get involved with the game at once." Bluth ponders the future of arcade games: "Think of that! It's really a communal experience versus the solo person playing the machine. It's a trend I'd like to encourage."

It's also a trend that families will appreciate. An animated arcade featuring a variety of colorful characters could change the way families view computer entertainment, and most certainly will transform the notion of sitting in front of the TV screen. FC

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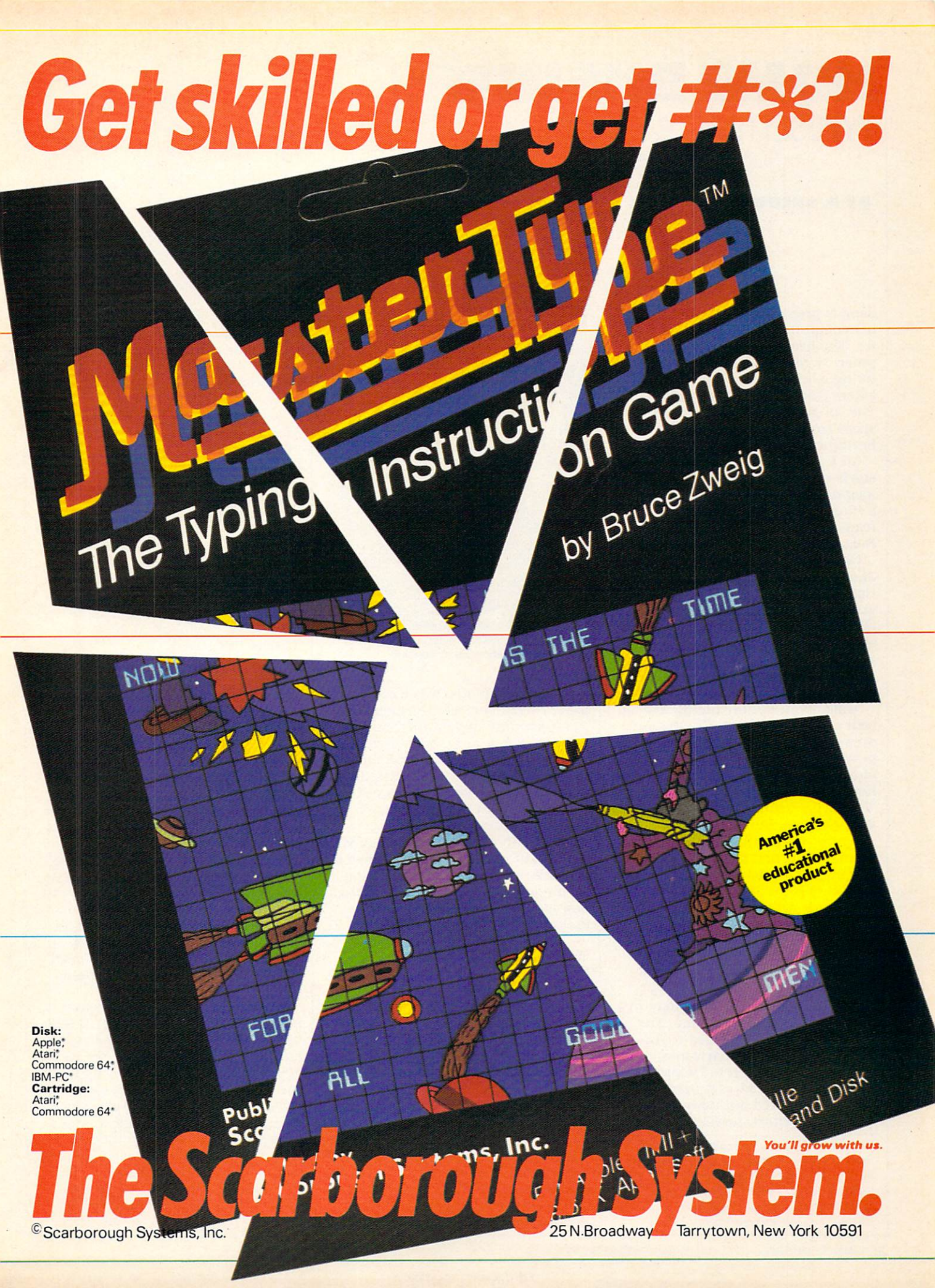

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HOME BUSINESS
TYPESETTING BY MODEM

BY P. GREGORY SPRINGER

Jane is preparing the first issue of her computer users' group newsletter. The headline: "Man Bites Computer." Wrestling with art-store lettering, she begins to cut out the letters from clear adhesive sheets. The "p" gets stuck on her nose. She spells computer with two "t"s. The headline comes out crooked.

An hour later, in frustration, Jane starts cutting extra letters out of magazines, turning her project into a ransom note. The jagged headline reads: "Woman Holds Newsletter Hostage."

Obviously, someone needs to tell Jane about the typesetting revolution. Until recently, typesetting was expensive, and required working closely with an artist in a typesetting shop. Now, anyone with a computer, a modem, and the ability to type can typeset from home for relatively little money.

"Talk about optimizing the use of your equipment," says Charles Andrews, who operates Dataprint, a printing business in Virginia, while managing his art gallery in his hometown, Carlilse, Pennsylvania. "Real typesetting equipment costs $15,000-plus, and that's for a cheap machine. But with just a wave of my hand, I've turned my computer into a typesetting machine. Learning to typeset is rather like programming, but—boy!—you can get paid for it."

Andrews produces a standing order of 30 new business cards a week. He prepares the name and style of each card at home on his TRS-80 Model III and transmits it over the phone lines via modem to a remote typesetting company. The finished product is mailed to Andrews' gallery in Pennsylvania, or picked up and taken to Dataprint.

When Kent Shaw of Annandale, Virginia, scouted out typesetters for his EDP Auditors' newsletter, the price usually quoted was $25 per page. He read an advertisement for "do-it-yourself" typesetting, and decided to give it a try. "Costs are considerably lower. We spent $50 total for our last six-page newsletter, and we expect it will be even less next time. It has just meant going through a learning process."

Kevin Kelly, founder of *Walking!* magazine, typesets his publication by modem

The ability to typeset from home at low cost opens up a wide range of possibilities—especially for setting up a home business. [*See* "Walking! *A Magazine Made by Modem*," *on opposite page.*]

WHAT IS TYPESETTING AND WHAT IS IT GOOD FOR?

Because molten-lead typesetting—"hot type"—has begun fading into history, most magazines and newspapers today are printed using a computerized photographic process called electronic typesetting. Now, typesetting can be used to professionalize and enhance the look of a variety of smaller print jobs, such as local advertising flyers, catalogs, booklets, business cards, a school or collectors group newspaper, church bulletins, posters, personal greeting cards, resumes, graphic designs, and even books.

One family wrote a short Christmas parable, using the names of all the members of their clan. They typeset it and printed it onto calendars as a special, personalized gift for their relatives.

Jackie Giuliano, who lives in Los Angeles, California, typesets press material for a folk duo he manages with his Otrona Attache portable computer. He also provides advertising material for a group dedicated to preventing cruelty to animals.

If you want to start a typesetting business from your home, be on the lookout for inexpensive publications, or nonprofit organizations that may need posters or typed newsletters. You can probably offer them a better price to do the job than most commercial typesetters.

HOW IT'S DONE

Keying, or typing, is the bottleneck of the typesetting business. When work has to be retyped directly onto a typesetting machine, the cost of the work soars. After it is typed, it must be coded. Finally, through a photographic process, the type emerges. Now, both the typing and coding can be done on your computer at home.

Coding involves decision making and sometimes mathematical calculations to convert a typographic unit of measure, the pica, into inches. How large do you want the type to be? What print style should you choose? How wide will it appear on the page? How much space should there be between the lines?

Type-Share Inc. (8315 Firestone Blvd., Downey CA 90241; (213) 923-9361) offers 72 different typefaces and charges from $4 to $6 per foot of printed material, depending upon the width of the paper. Although located near Los Angeles, Type-Share accepts coded text through CompuServe from anywhere. In the next two years, it intends to open 10 new centers across the country.

"We don't code at all. We are a 'slave' operation for customers. We don't even look at the words," says

PHOTOGRAPH BY JOHN PATTON

P. GREGORY SPRINGER, *a freelance writer from Urbana, Illinois, is a correspondent for* The New York Times *and* Variety. *His last article for* FAMILY COMPUTING *was "10 Gifts Your Computer Wants for Christmas," in the December issue.*

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Steve Westmoreland, president of Type-Share. "Our coding manual is very complete and very instructive. It contains the full contingent of commands, so a user can create either a paragraph or a full galley of text. There's a minimum charge of $3, but the customer must have a deposit account of $100 minimum or a credit card. Our manual costs $100, and there is no setup fee after that."

What happens if a customer has coded incorrectly, causing an overload of expensive photographic paper to come pouring out of the machine? Westmoreland explains, "If a mistake causes over two feet of continuous bad copy, we charge one half for the job. It's a decision we make, rather than the customer."

The code keys for Type-Share, which started its service for Commodore computers exclusively, but now is available for all kinds of computers, are the slash key (/) and the greater-than sign (>), the same keys used for commands in many spreadsheet programs.

Type-Share charges by the foot, according to Westmoreland, because "it's a heck of a lot easier to price out a job according to length." Some companies charge by the number of characters in a job.

One such company is Intergraphics (106-A S. Columbus St., Alexandria, VA 22314; (800) 368-3342). The charge is $2 per 1,000 characters, regardless of the size of the type. "Customers get on-line at low cost," says Norman Bringsjord, an Intergraphics employee. "Their only setup cost is the coding book, which costs $10. We sell between five and 10 books a day." They can handle 16 jobs at a time over toll-free lines, 24 hours a day.

Intergraphics uses brace symbols ({}) to contain the coding information. Every change in format or style is preceded by a braced designation. For example, "{f385}" will tell the machine to change the typeface to Helvetica Bold for every character that follows, or until another code is received. A "{p24}" indicates that the size of the type will be 24 points high. Every end of line or the return after a paragraph must have a "quad" designation—left, right, or center—such as a "[ql]."

Both Intergraphics and Type-Share, although using different coding and pricing techniques, offer a turnaround time of 24 hours, with most jobs returning to the point of transmission in an average of two days. When looking for typesetting shops that will accept your phone transmissions, don't overlook your local newspaper. Often it will have spare time on its equipment that is waiting to be filled. But many typesetting companies are reluctant to do "nickle and dime" jobs for the home computer hobbyist, even when they have the capability. →

WALKING! A MAGAZINE MADE BY MODEM

Kevin Kelly loves to walk. He also loves computers. The result—a magazine called *Walking! Journal* that is economically viable because of the multiple ways Kelly uses his microcomputer.

At a time when most magazine startups require multimillion dollar investments, usually involving major financial commitments from venture capitalists, this 31-year-old from Athens, Georgia, has used his Apple II computer to typeset his entire 32-page magazine, headlines and all. Working out of his home, Kelly has achieved economies of scale that just a few years ago would have been realized only when a magazine's print run reached 100,000 copies of an issue. Yet the premier issue of *Walking!*—the Summer 1983 edition—had a print run of only 4,000. The price of a copy was 40 cents an issue. With the computer, production costs were held so low that no outside investors were needed.

"Total cost for starting up at ground zero, including typesetting, printing, stationery, phone, advertising, fees to freelancers and illustrators, and postage has been about $4,000," Kelly says. "And I knew close to nothing about running, let alone launching, a magazine other than the kind of stuff I picked up by osmosis from my father, who works for the Time-Life empire."

At the annual conference of the Small Magazine Publishers Group, which took place last August in Kennebunkport, Maine, publishers from all over the country, including many who started out in spare-room offices, came to exchange ideas on how to improve results and quality, while lowering costs. Though Kelly was one of the newest and smallest publishers who attended, his experiences using a microcomputer for typesetting earned him a spot on the conference agenda.

Here's Kelly's description of what he does with his Apple II and off-the-shelf software:

Freelance manuscripts are edited and typed into the Apple with its word-processing program, corrected on the screen, then printed out on an inexpensive dot-matrix printer and proofed for typos. A clean copy is printed out and, in some cases, sent to the author. Then Kelly keys in typesetting commands, and all this electronic data is transmitted from the Apple, through the telephone lines, to the local newspaper. Only a modem is needed; Kevin's cost about $200.

"The local newspaper has surplus time on its fancy typesetting equipment, and professional-quality type is printed out. We bring it back in galley form to paste up, and make 'camera ready' copy for the printer to photograph. We also use this same process for making catalogs, newsletters, and press releases."

When you publish a magazine or run a mail-order business from your home or small office, you have to maintain customer lists. Kelly does this by entering names and addresses onto floppy disks using a $69 software package. Names are sorted by zip code, printed out on labels using the dot-matrix printer, and affixed to envelopes, catalogs, and the like, to be bulk-mailed.

In addition to subscriber names, Kelly has about a dozen other floppy disks with stored names of potential advertisers, publicity contacts, and suppliers. Any file that gathers more than 25 names goes onto its own list in the computer. Kelly can add, delete, or sort at will. A master list of each disk is printed out in alphabetical order to serve as a reference directory.

Besides his magazine, Kelly also publishes a mail-order catalog called *Nomadix*, setting it the same way as the magazine. The catalog lists guidebooks for "travelers without much money." He offers to send one to any reader requesting it (P.O. Box 454, Athens, GA 30603).

In an age when specialized information is the key to many new business opportunities, Kevin Kelly is showing the way microcomputers can be used to hold down costs while building up a customer base.

—JEROME GOLDSTEIN

JEROME GOLDSTEIN *and his family publish* In Business *magazine, in Emmaus, Pennsylvania.*

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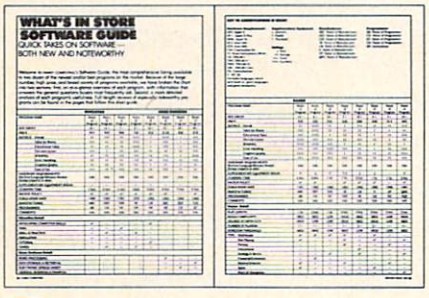

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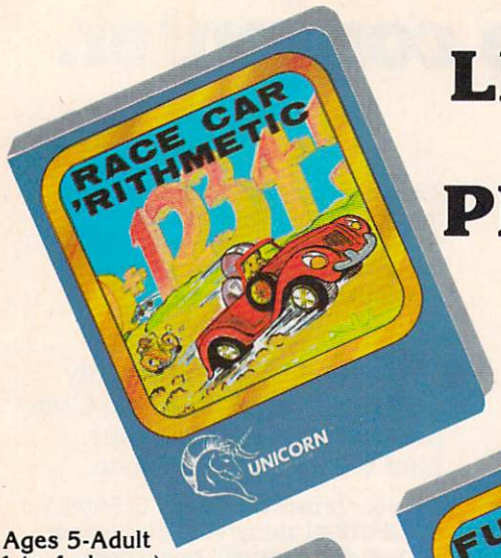

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HOME BUSINESS

FURTHER BREAKTHROUGHS AWAITED

The history of typesetting has not reached its final page. Improvements continue to be made on the Optical Character Readers (OCRs), which enable machines to read directly from typed material and transfer the typing onto a video screen. Voice interpreters can read and transfer sounds into screen letters. Both these methods, when perfected, will alter the way typesetting is done.

But, for the present, almost any microcomputer is capable of creating error-free, straight-lined, perfectly neat typeset material—without the hazards of sticky letters, shaky fingers, and total frustration. FC

TYPESETTING LINGO

Q. What is a font?

A. A font is complete assortment of type (letters, numbers, punctuation, etc.) of one size and style. Fonts come in many shapes and sizes: fancy, plain, bold, italic, script, and even dot-matrix. Some are more suitable for certain purposes than others. For example, *Park Avenue Script* is too frilly for a pamphlet on automobile repair, and **Memphis Extra Bold** is too thick for a wedding invitation.

Q. What is measure?

A. Measure refers to the width of the typed line. It is counted in picas; there are six picas to an inch. For example, if you set the measure of a job to 42 picas, the width of the line will be seven inches.

Q. What is point size?

A. A point is the equivalent of approximately one seventy-second of an inch; there are 12 points in a pica. Characters are stated in points rather than larger, less precise inch measurements. The largest type available from Intergraphics—72 point—is one-inch high, and is used for headlines. Very tiny type, sometimes called "the fine print," measures about 4.5 points.

Q. What is leading?

A. Leading, pronounced "LED-ing," refers to line spacing. Just as a typewriter has single, one-and-a-half, or double spacing, you can choose how much space you want to appear between typeset lines. Leading is also stated in points, and is usually one or two points larger than the character point size. —P.G.S.

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COMPUTING CLINIC

GOOD LEARNING PROGRAMS/ PHOTOGRAPHS OF COMPUTER DISPLAYS/ USING BACKUP COPIES

BY WALTER KOETKE

Is there a book that teaches the parents of young children how to construct an effective learning program? While there is some excellent software out for the TI-99/4A, which I own, most of it is quite expensive. I can program fairly well, but am at a loss as to what elements are important in a good learning program, e.g., rewards of smiling faces, frowns for missed answers, etc. My daughters are aged five and two.

BRYAN J. WHITE
Columbia, MD

I'm not aware of an especially good book that addresses your question. However, I believe that some general characteristics of good learning programs for young children include:

1. A better way to present materials. Pencils, paper, books, blocks, crayons, and even pegs in a hole are proven implements of learning. A good learning program should either do something more effectively than can be done in a traditional manner, or do something that can't be done at all in a traditional way.

2. Appropriate use of graphics and sound. Computer-based material, especially those for younger children, should include colorful graphics and uplifting sound. These effects can be used to both motivate children and enhance their enjoyment.

3. An interactive element. Interaction does not mean pressing the space bar to see the next screen. When two children interact, each makes decisions based on the actions of the other. When a child interacts with the computer, a similar, mutual modification of behavior should result.

4. Custom-made features. One of the most exciting potentials of computer-based learning is the ability to truly individualize. Rewards, for example, must suit the learner. Smiling faces and "excellent work" appeal to a small group for a limited time. You should find the rewards that appeal to the children and incorporate them in your program. When the rewards are no longer valid, change them.

I realize that just these four characteristics require a great deal of careful design and programming. That's one of the reasons good learning programs are neither inexpensive nor plentiful.

I suggest you begin with well defined but very limited learning objectives. Write one or two short programs and test them with your children. The experience you gain will prove invaluable for subsequent efforts. And when you do produce a learning program that works well, be sure to share it with your children's teachers. You might also want to check FAMILY COMPUTING's special report on "Preschool Computing," in the November issue. Short program listings are included.

Every now and then I'd like to take a picture of the computer screen. So far, I've used four rolls of film with terrible results. Any suggestions?

ARTHUR L. ENO
Humble, TX

I've read several theories about photographing computer screens, but the only one I can speak for is that used by William Gallagher. He takes most of the screen shots for publication in FAMILY COMPUTING and gets consistently good results.

He uses a 35mm camera and shoots in a darkened room, so that the only light comes from the screen itself. If this is not possible, drape a blanket over the screen and yourself to form a "photographer's hood." Put the camera on a tripod; if you don't have a tripod, brace it against something very stable. Gallagher uses Kodachrome 64 ASA film, and exposures ranging from 1/8 second (if there's movement) to 1 second. Take the F-stop setting from the light meter, and "bracket" one stop above and one below to ensure a good result. He uses a 50mm lens, and usually places the camera about two feet from the screen. The 50mm lens picks up some of the screen's curve, which gives a more realistic photograph. To achieve a flatter, "poster-like" print, try a 100mm or 135mm lens.

Kodak has a new brochure describing how to photograph TV and computer-screen displays. For a free brochure, send a stamped, self-addressed, legal-size envelope to Eastman Kodak, Dept. 841, Rochester, NY 14650. Ask for brochure #AC-10.

I have one comment on your September Computing Clinic answer regarding backup disks. I feel, as many others do, that the original copy should be placed in a safe place and the backup copy used on a regular basis. You suggested the opposite.

DAVID LORD
New Berlinville, PA

If you really keep that original locked up, then your suggestion certainly reflects the proper spirit of protecting copyrights. Since you're rarely using the original, you are not very likely to have it damaged or need replacement. Good idea. FC

Send your questions, general or machine specific, to: FAMILY COMPUTING, *Computing Clinic, 730 Broadway, New York, NY 10003. Please include name, address, and phone number.*

WALTER KOETKE *introduced computers into U.S. public schools, linking the Lexington, Massachusetts, system to a mainframe in 1964. In 1969 he worked with Seymour Papert, inventor of LOGO, who brought that programming language to the same school system. He has written for* Creative Computing *and* Microcomputing *magazines, and frequently lectures about computers to parents and educators.*

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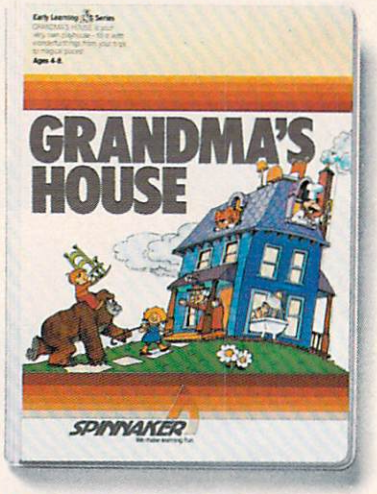

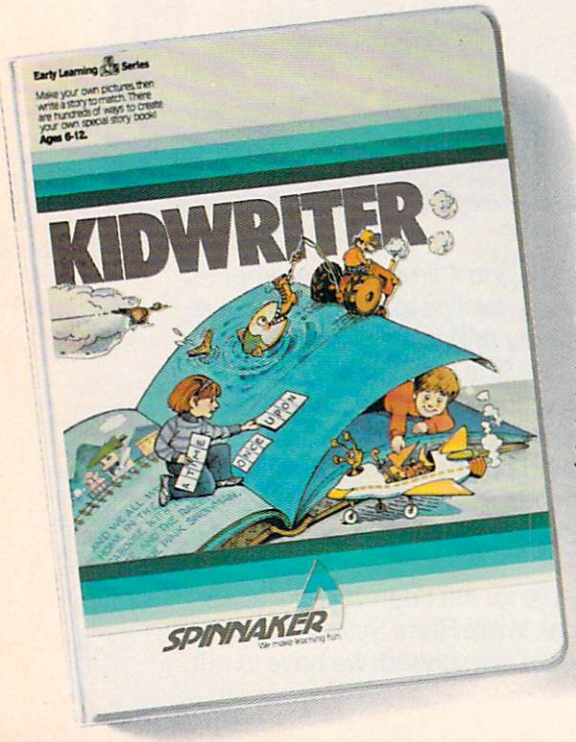

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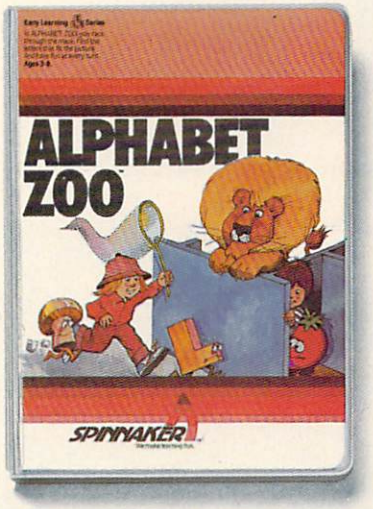

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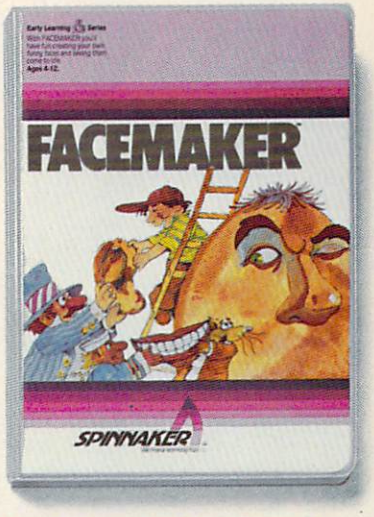

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FACEMAKER lets children create their own funny faces on the screen, then make them do all kinds of neat things: wink, smile, wiggle their ears, and more.

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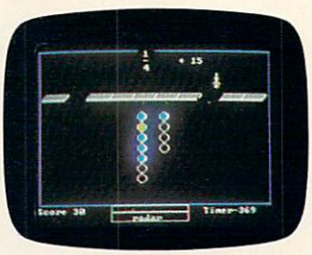

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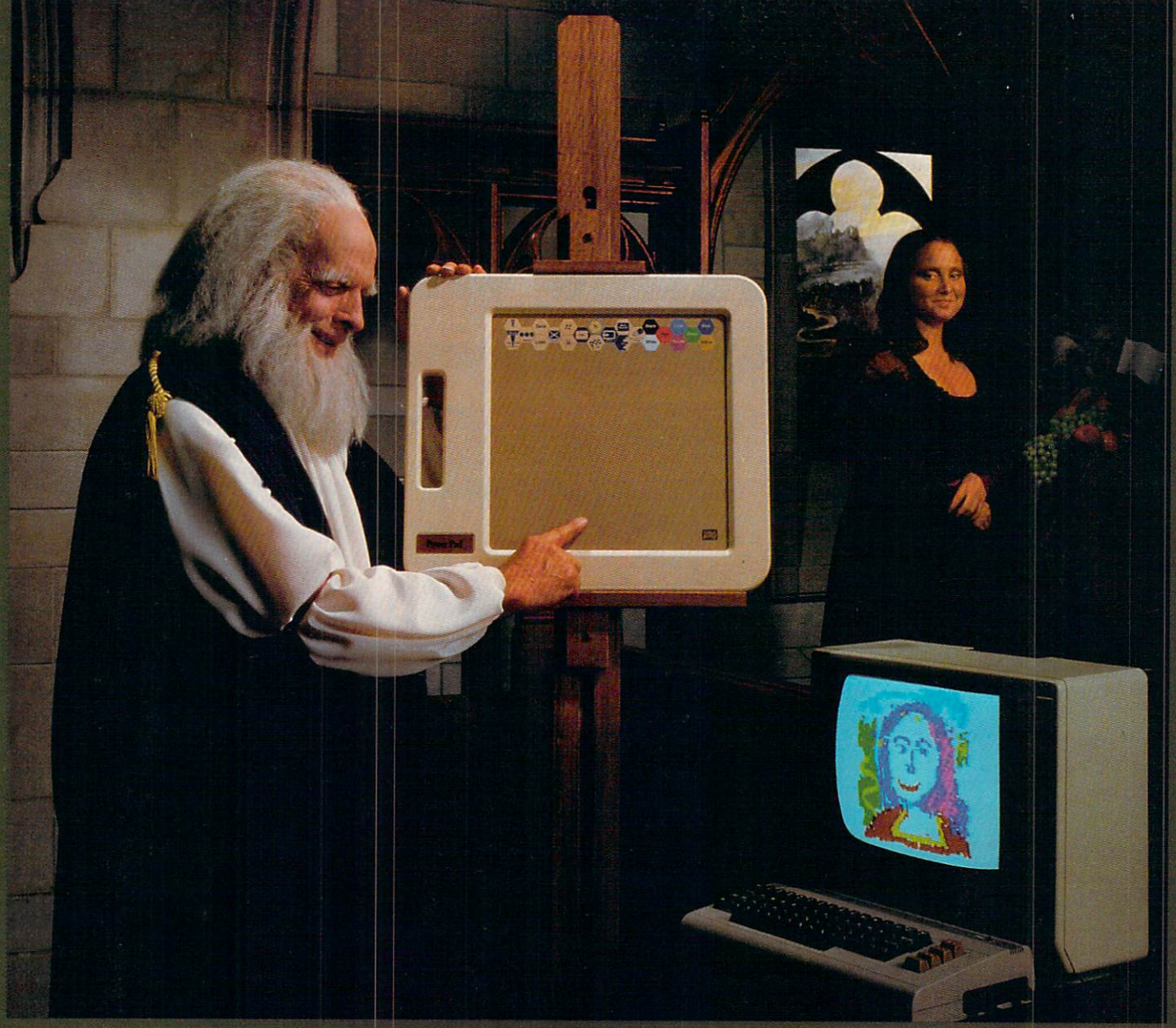

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64 INCHES OF COURAGE

BY MARD NAMAN

ALMOST FOUR YEARS AGO, A SKI ACCIDENT CHANGED A TEENAGER'S LIFE. NOW, AN APPLE COMPUTER HELPS KEEP HER DREAMS ALIVE.

It took a tragedy for the Alioto family of San Francisco to realize how important home computers could be to them. In April 1981, 12-year-old Michela Alioto plunged 30 feet from a ski lift to the hard-packed snow at California's Heavenly Valley ski resort. The accident left Michela—the granddaughter of former San Francisco Mayor Joseph L. Alioto—paralyzed from the waist down. She now lives pretty much out of her wheelchair.

Before her accident, Michela had never really thought about computers. Now a week doesn't go by that Michela doesn't think about them. Computers not only help keep her healthy, they also hold the key to her future ability to walk. What's particularly impressive is that the same Apple II plus computer she uses at home to play *Space Invaders* and at school to take tests also enables her to exercise her legs and keep them as toned as the leg muscles of any of her friends.

Physical therapist Stephanie Earle attaches electrodes to Michela's legs during an exercise session.

COMPUTER-AGE EXERCISES

Twice a week, Michela rolls into San Francisco's Pacific Orthopedic Group for some computer-age exercising. She's assisted by a physical therapist named Stephanie—a doctor is not required to operate the computer. Stephanie helps Michela out of the wheelchair and onto the exercise bed. Michela is now a beautiful 15-year-old girl. Although she has been paralyzed almost three years, one is struck immediately by the fact that her legs appear to be perfectly normal. One would expect them to look weak from lack of use. But in a minute it becomes clear why she is in such good shape.

Michela hangs her legs over the side of the bed. Stephanie attaches three electrodes to each of Michela's legs. She then goes to the Apple keyboard to punch in directions. The computer asks which muscles are to be exercised and how much weight is to be lifted. Stephanie types in the answers. She also types in the range of movement each leg will travel and the speed with which the legs move. The computer asks if it should begin exercises. Stephanie pushes one more button and Michela starts doing simple stretch exercises. She then moves on to leg kicks, leg kicks with weights, and several other specific-muscle ex-

PHOTOGRAPHS BY ROGER RESSMEYER/STARLIGHT

ercises. The computer always orchestrates the movements smoothly—first the right leg, then the left . . . right leg, left leg . . . again and again.

For the simple leg lifts, the computer counts off 75 repetitions. It keeps track of the movements and measures the increased heart rate and level of muscle fatigue. When the requisite number of kicks have been performed, the computer plays a little victory march (da da da DAT de DA!) and it's on to the next exercise. The whole thing takes between an hour and an hour and a half. It's so simple that Michela will be able to do it at home with her mother's help if she chooses to. Michela already has the identical Apple computer next to her bed at home.

THE DOCTORS AND THE COMPUTER

Michela's doctor, Robert Gordon, is an enormously energetic man with a bald head and a goatee. He laughs heartily between puffs on his exotically carved pipe. His office is small and cluttered: files all over the place, a wheelchair in the corner, and a plastic model of human vertebrae on his desk. "I thought I'd live my whole life very happily without ever having to face a computer," he says. "I was very happy doing what I was doing, and then this thing came along," he adds, pointing to the Apple II plus. "I realized it was the wave of the future. It's like moving to a foreign country. If you don't speak the language, you don't get along very well."

Dr. Gordon is an orthopedic surgeon, not a computer maven. He and the Aliotos live on the same block in one of San Francisco's prettiest neighborhoods. And, in a way, they all came to computers as a result of Michela's accident. They needed to know computers to give Michela the best therapy possible. So Gordon and Michela's parents, Michele and Joe, all took a computer class together.

Gordon gets very excited when he talks about computers and their future potential. "We use the computer as a substitute for the brain, the small part of the brain that controls the muscle groups we want to exercise. Michela, like others we work with, has a normal brain and normal muscles. The problem is that the bundle of wires connecting them—the spinal cord—is interrupted. She can't get messages from the brain to the muscles. No one can send messages across a severed spinal cord, so we're bypassing the spinal cord. We're substituting a mini-brain—the computer—which connects directly to the muscles."

The benefits are twofold. Not only does the computer stimulation prevent atrophy (unexercised, a muscle shrinks to nothing and the bones become so brittle they can break with almost no pressure), but it also builds up the muscles and bones as though the person had actually been lifting weights or jogging.

The use of electricity to stimulate muscles is not new. As far back as Hippocrates's time, the disabled were put into tubs together with electric eels. This activity exercised the muscles, but it also sometimes killed the patients. And in modern times, it has been possible to get a simple reflex action from a single muscle by connecting a paraplegic to a simple electrical circuit. But the result would be an uncontrolled, jerky, nonaerobic motion.

Gordon says, "We're now not only exercising the muscles, we're also exercising the heart and lungs, which is something that quadraplegics (who have no use of their arms or legs) really lack. This would be impossible without the computer. The computer has multiple circuits and integrates all the muscles together. We can control the exercise they're getting. When they first start exercising, they get a very weak muscular response. The computer can sense that and provide just enough stimuli to make the muscle move through the range we want. Eventually, you could exhaust the muscle, just like when you're running you get to the point where you just drop from fatigue. Of course, our exercises never take the muscles to that point." And, the motion is surprisingly natural and smooth, just like any other person would move. Adds Gordon, "The computer gives a controlled movement. It brings the muscle up and down slowly. It tells us the position of the muscle at any moment and the rate of change in that position."

The software program that makes this exercise possible is a result of research work by Dr. Roger Glaser of Wright State University in Dayton, Ohio. Outside the university, Dr. Gordon is one of only a handful of doctors in this country using this computerized exercise program. But soon its use will be widespread [*see accompanying article*].

A GREAT RESEARCH GOAL

The ultimate goal of all this research is to make people walk again. And this dream now seems closer than ever. In November 1982, history was made on the same Wright State campus. Nan Davis, a 22-year-old paraplegic, stood up in front of TV news cameras and took several computer-assisted steps. Strapped into a harness, she gripped a pair of parallel bars as she walked. The movements were crude and jerky, but it was clear that the marriage between electrical stimulation and computers was successful. How did it work?

When we walk normally, the brain sends

AS FOR THE APPLE II PLUS, IT HANDLES THE EXERCISES WITHOUT EVEN BREATHING HARD.

FINDING A CURE

The American Paralysis Association, founded by Michele Alioto, is dedicated to finding the earliest possible cure for spinal cord injuries. It encourages and provides financial support for all kinds of research—surgical, chemical, and electrical stimulation. If you would like more information, or would like to make a contribution, write the American Paralysis Association, 111 Sutter Street, San Francisco, CA 94104, or call (415) 434-1514. They will send you a brochure detailing their work and a quarterly newsletter with the latest scientific developments.

MARD NAMAN *is a San Francisco–based writer and the associate producer of the* P.M. Magazine *television show.*

THE RESEARCH: ONE STEP AT A TIME

"WE USE A COMPUTER AS A SUBSTITUTE FOR THE BRAIN, THE SMALL PART OF THE BRAIN THAT CONTROLS THE MUSCLE GROUPS WE WANT TO EXERCISE."

Every 30 minutes, someone in America is paralyzed by spinal cord injury. There are more than half a million paralyzed people in this country. Most have been told they will never walk again. But history was made and hope ignited a year ago when a 22-year-old student named Nan Davis walked with the aid of a small computer.

That computer was developed in Dayton, Ohio, the culmination of 13 years of research into the link between computer wiring and the human spinal cord. Doctors contributing to the effort were Jerrold Petrofsky, Roger Glaser, and John Gruner.

Dr. Petrofsky, the director of Wright State University's biomedical engineering laboratory, is an electronics wizard and avid tinkerer who knows Nan's first step was just that—the first step in getting dormant limbs to function again. Even more heartening than Nan's walk last year was her graduation from Wright State last June. At that event, just five years after an automobile accident on her high school graduation night left her paralyzed from the waist down, she walked to the commencement platform to receive her college diploma.

This was the first time since the accident that Nan had walked outside a laboratory setting, and she did it with the aid of a portable computer that electrically stimulated her paralyzed muscles. This portable system differed markedly from the stationary computer system she had used last year. She originally wore a safety harness and walked holding on to parallel bars. These precautions were no longer needed because of advances in Petrofsky's computerized system, and because of the strengthening of Nan's bones and muscles from an exercise regimen devised by Dr. Glaser.

The computer itself has been miniaturized from a full-size desk-top model to one small enough to be carried in a purse. Balance is achieved with "level detectors" that tell the computer the position and movement of the legs so the computer knows which muscles to stimulate electrically to achieve coordinated movement. With this system, Nan can not only stand and walk, but walk backwards and sit down as well. Petrofsky says that if an electrode wire breaks or the person using the system trips, the computer is able to compensate and stimulate other muscles to keep the person from falling.

Petrofsky is convinced that the next few years will bring many more advances. He says, "We will be working on further miniaturization of the computerized portable walking system and at implanting the electrodes in the body over the next year or two."

Petrofsky says the size of the computer could shrink to the size of a small calculator or even a postage stamp, but only if a big electronics company gets involved. The entire system could be a small microprocessor, implanted pacemaker-style. Petrofsky hopes his walking system will be ready for commercialization within a decade.

But there are other commercial products much closer at hand. In addition to the leg lift machine used by Michela Alioto [*see main article*], there's an indoor exercise bicycle and outdoor tricycle. Says Petrofsky, "We will make these active physical therapy devices available to hospitals and rehabilitation centers over the next couple of years. We need to set up training sites for professionals who will be administering these devices to patients. And we will work to achieve more sophisticated movement with our walking system."

And the cost? It's hard to know for sure, but Petrofsky expects the microchip implant (to send and receive messages) to cost about $500 for the hardware. Stationary and outdoor computerized bicycles should be priced about the same as wheelchairs.

All in all, the new computerized systems will go a long way toward helping paralyzed people. But Petrofsky cautions against hope for instant results with walking. "There are still a lot of questions we're trying to answer," he says. "This is a research project, and that's often misunderstood. We're just getting into the clinical use now . . . but we have a long way to go." —M.N.

electrical messages in a specific order to specific muscles in the body. A computer was programmed to send successive bursts of electricity, each carefully orchestrated to trigger the right muscle at the proper time—just as the brain would.

Nan Davis's walk stemmed from 13 years of research by Wright State's Dr. Jerrold Petrofsky. A computer feedback system monitored the movements of Davis's ankles, knees, and hips, making corrections as necessary. Petrofsky predicts that his system will be commercially available within a decade, maybe less than five years from now.

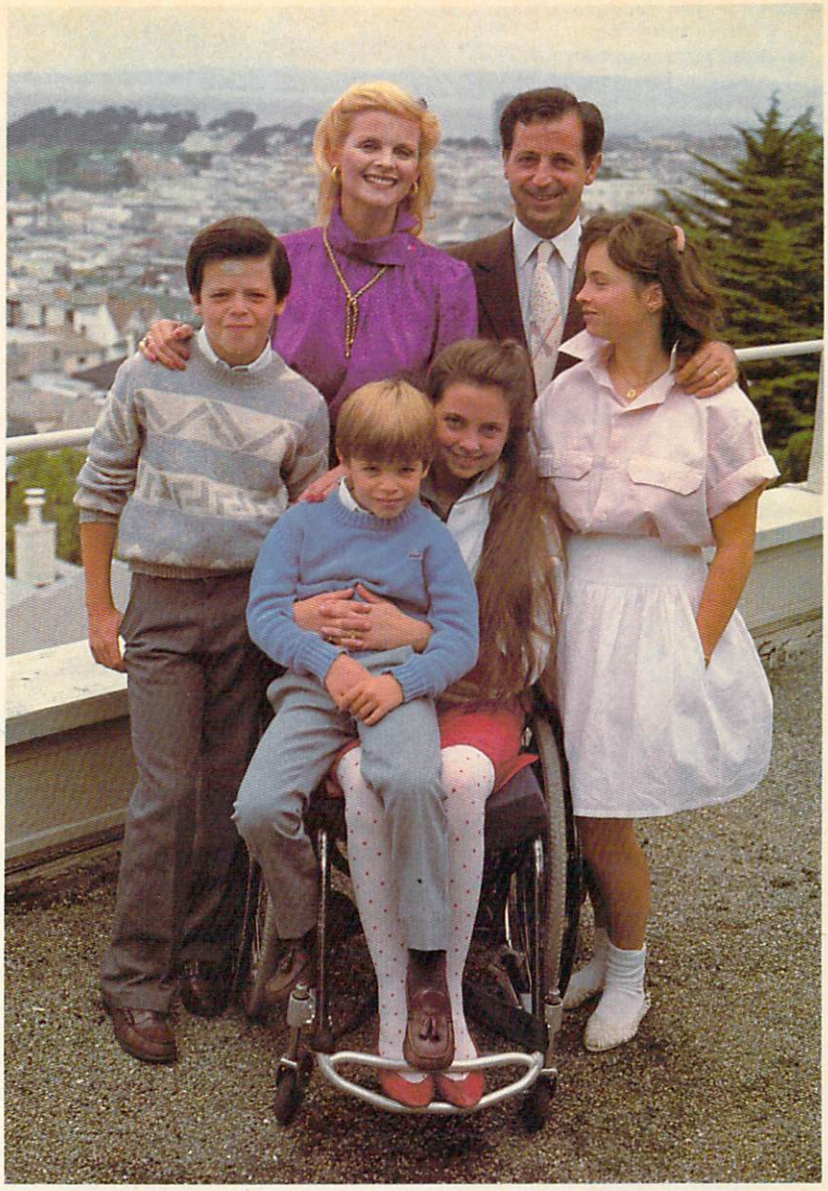
Dr. Gordon says, "Some bugs still have to be worked out. It's a matter of coordinating all the muscles involved. What's to keep one of the patients from walking in front of a street car? How do you start and stop it? And you don't want a problem where they will be overstimulated or understimulated. The problems for quadraplegics will be even greater, because you also have to provide balance." To solve this last problem, researchers are now working on a gyroscope.

Of course, the number of muscles used to walk is much greater than those for simple exercises. Michela now has three electrodes on each leg for a simple leg kick; to walk she would need about 18 electrodes on each leg. To solve the clumsiness of using so many wires, doctors are now working on a way to implant these electrodes surgically. As for the Apple II plus, it handles the exercises without even breathing hard. The Apple is certainly capable of handling much more complex muscle movements. As Gordon says, "It could be playing chess while doing the muscle stimulation—we're just using a tiny fraction of its capacity."

MORE HELP FOR THE HANDICAPPED

If computer-assisted walking will become commercially feasible within five to 10 years, other practical uses for computers are here now. One is a wheelchair with foot plates that stimulate the person's feet to go back and forth. The plates are attached to the motor drive of the wheelchair, so that with the aid of a tiny computer, the person's movements stimulate the muscles and push the chair. Basically, it's a way for quadraplegics to be mobile and exercise, too. And, Wright State's Dr. Glaser is just now putting finishing touches on the software program for a computerized stationary bicycle for paraplegics. Michela hopes to use the bicycle in the future.

But at the moment, the best use of computers is keeping the muscles and bones strong. There's an old expression—"If you don't use it, you lose it"—and computers enable people to "use it" as never before. Says one worker in the field, "Computers help maintain healthy bodies between now and the time when we find a cure. A cure won't do people any good if there's no calcium in their bones and their muscles are atrophied."

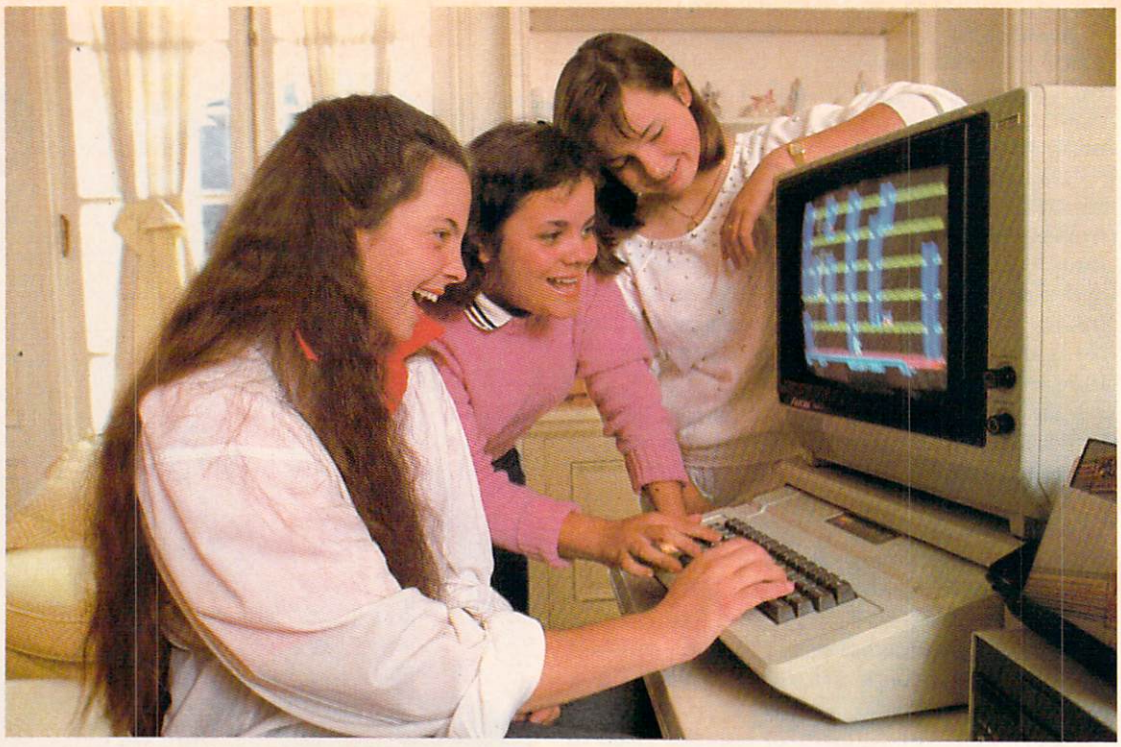


Up on the roof: The Alioto family (clockwise) includes Michele, Joseph, Angelina, Michela, Alexander, and Joseph, Jr.

GROWING UP INDEPENDENT

Michela waits for the day she can walk again, but meanwhile, life goes on for her pretty much as before. No big deal. She is in many ways just like any other kid. She goes to school, comes home and does homework, then goes out and plays with her friends. Her bright, innocent face belies the strength of character that lies beneath the surface. Ask her what she can't do now that she did before her accident and she'll say, "Nothing—except walk." She is a remarkably upbeat, positive person. Anyone who knows her will tell you that she is extremely independent and gets around with very little help. She even took a trip to Britain last summer with friends. Her parents just bought her a new car, complete with hand controls, so her mobility is greater than ever. (She received a special license to drive before the legal age.) She rarely complains and is considerably less moody than most kids her age. If her handicap is a terrible burden, she has learned to bear it with a smile.

Michela had one computer class as a fresh-



Apple Panic: Michela and friends play computer games in her bedroom.

man in high school, but her mother says it wasn't very thorough. Next summer, Michela's going to take another class.

This year Michela isn't using computers at school. But as a freshman, she had a history teacher who was really into computers. For this class, Michela and all the other students took tests on computers. They would take turns at one of several computers in the classroom. Each student would type in his or her name and the name of the test, and then wait for the computer to ask questions. They would then type their answers into the computer.

ASK HER WHAT SHE CAN'T DO NOW THAT SHE DID BEFORE HER ACCIDENT AND SHE'LL SAY, "NOTHING—EXCEPT WALK."

While Michela benefits greatly from this computer age, her interests are more of a classical nature. She never was a computer whiz kid or *Pac-Man* fanatic. She plays the harp and loves history and politics. Since her accident, she says, "Nothing's changed." Of course, getting around in a wheelchair means she uses her arms a lot. "I can beat everyone in my class in arm wrestling," she giggles. She plans to go to Harvard and get a law degree. Then she wants to get into politics on a national level.

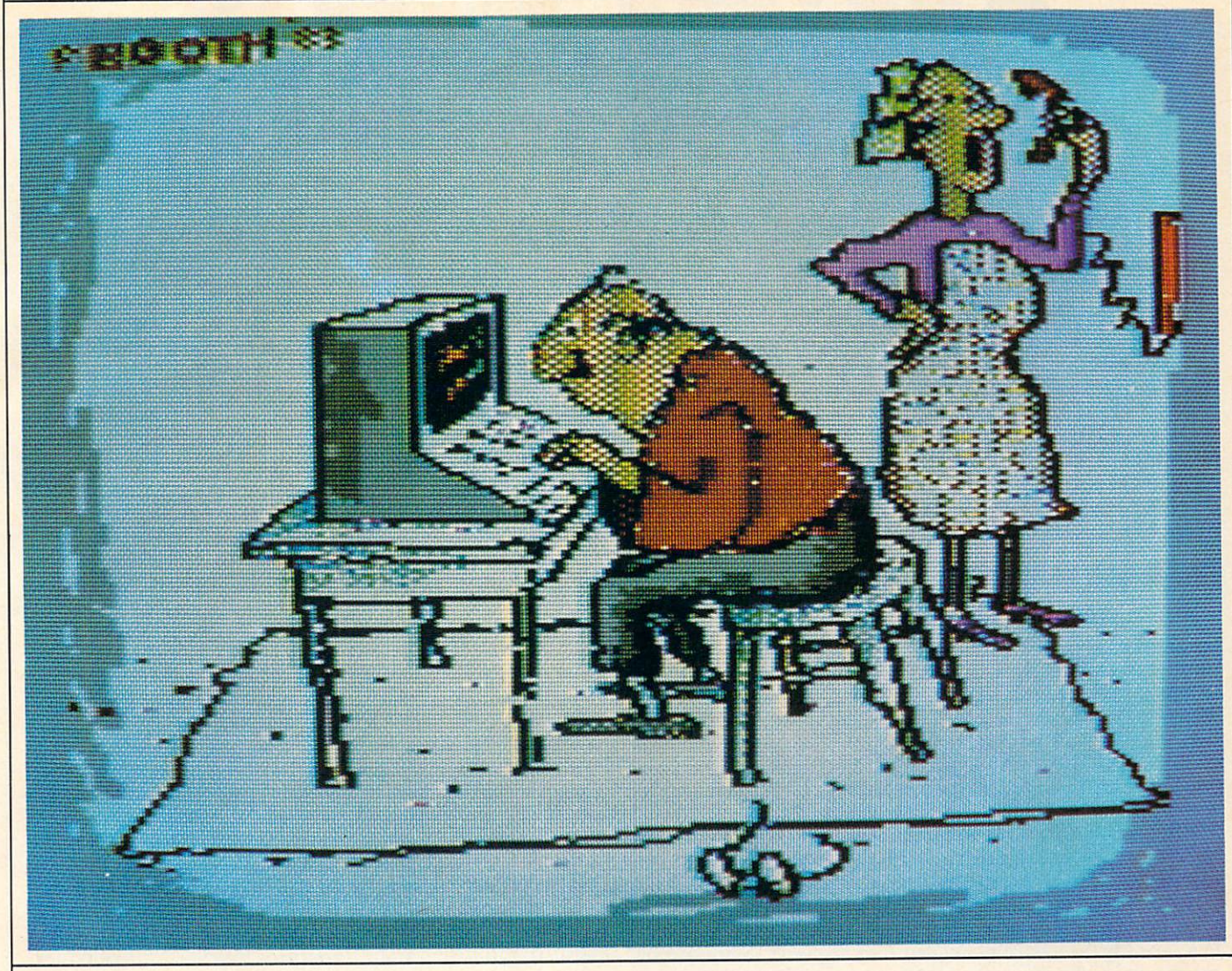
COMPUTER-BASED OPTIMISM

For Michela's mother, Michele, her family has always been a main focus of her life. Since her daughter's accident, she has thrown herself into the cause of finding a cure for spinal injuries. She speaks with the optimism and conviction of a true believer. What she truly believes is that paralysis is not necessarily a life sentence; that those in wheelchairs will walk again. It is a belief in the power of science: If only more time and more money are spent in the right experimental research, we will find The Answers.

Exactly one year after Michela's injury, Michele founded the American Paralysis Association [*see box*]. Michele says enthusiastically that it is "the only organization whose single goal is to find a cure." She and her husband, attorney Joe Alioto, have proven themselves to be powerful fund-raisers for the cause. They helped get funding for a lot of the experimental work being done at Wright State. They have also done a lot to dispel the notion that people in wheelchairs are hopeless cases. Michele has little patience for those in the medical profession who say cure is impossible: "Doctors who say it can't be done, say it out of pure ignorance," she says. "It has nothing to do with the facts."

Michele does have high hopes, but her feet are planted firmly on the ground. And it is computers that give her the greatest hope and greatest cause for optimism. Dr. Petrofsky's computerized system may very well have Michela and others like her walking within five years. They've already shown the world it can be done. "There's a great correlation between computers and our bodies," says Michele. "We're living in the age of computers, and the central nervous system is the computer of the body. . . . Many feel this is the age of the central nervous system. The time is now. It's like anything else—when the time is right, there's no stopping it. All we hope to do is make it all happen sooner."

Michela's paralysis caused much grief—grief the family must live with every day, even two-and-a-half years after the accident. But Michele says, "It's had some positive effects. It's brought us closer together as a family. We're all sort of working together on a project that didn't bind us before." The project, of course, is a cure for paralysis. And, in that project, the computer has become like another member of the family. FC



"Our trip around the world, Elsie, will be after Harold cashes in on the hedgeapple boom."

When George Booth handed in his monthly cartoon to FAMILY COMPUTING we asked if he'd consider doing the same cartoon using the Koala Pad. He agreed to try, and spent an afternoon and evening sketching on a Koala Pad in our art department. He was a natural, as you can see from the above cartoon. Using the stylus on the graphics tablet didn't alter his style. "My cartoons look as if I've drawn with a stick anyway," he says. The artist noted, "You draw in watercolor, charcoal, pencil, oil, pastel, and now you draw in computer. It's like another medium, and you have to think in that medium. But most of all, it's fun." Booth got so enthralled with the new drawing tool that he missed the last elevator of the night and had to walk down 12 flights of stairs.

A BUYERS' GUIDE TO GRAPHICS TABLETS, LIGHT PENS, AND SOFTWARE

For even the experienced computer user, the sense of taking part in the miraculous always remains. This is true when simply placing words on the screen, and is especially the case when creating images. The electronically created art most of us are accustomed to is the work of professionals. Certainly most top-quality computer graphics seem removed from our own Crayola creations. Until recently.

Today, a growing number of graphics-related peripherals are available for popular microcomputer brands at a reasonable cost. They are easy to use and provide immeasurable amounts of fun for even the very young and the heretofore unaccomplished artist.

GRAPHICS TABLETS

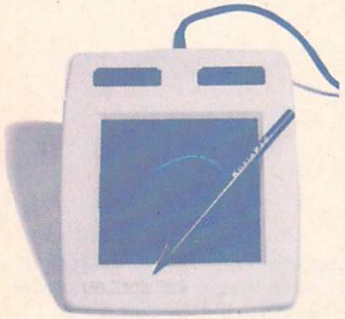
Anyone with an urge to draw will find either the KoalaPad or the PowerPad easy to use and freeing of inhibitions. Moreover, their potential usefulness is by no means limited to strictly graphics applications. Because the tablets are designed to electronically emulate common joysticks or paddle pairs, they may be compatible with some existing software for use as game controllers or input devices, and the manufacturers of both touch-tablet systems intend to support their products with future software releases in a variety of topic areas.

Even the illustrator, the cartoonist, and the painter may find these systems an interesting medium for experimentation. (See the accompanying articles on artists Paul Davis, Ken and Roberta Weiner, and Barbara Nessim.)

Today's medium-priced microcomputer graphics tablets, and the software packages that support them, are by no means fully developed CAD (computer-aided design) tools. Most are screen-based, lacking the ability to output directly to a color plotter or printer for hard copy.

KOALAPAD/*MICROILLUSTRATOR*

The **KoalaPad** touch tablet (see illustration—$125 for Apple, $150 for IBM, $99 for Atari and Commodore computers) is a small sculpted unit designed to be held comfortably in the hand. Its square, vinyl drawing surface measures 4 inches on each side. The tablet housing bears two push buttons that duplicate the function of paddle triggers, enhancing the tablet's control vocabulary and ensuring its compatibility with certain types of existing software as a substitute for standard hand controllers.



A stylus works best on the KoalaPad, with its 4-by-4-inch drawing surface.

Included in the basic KoalaPad package are a plastic stylus and a disk or cartridge containing Koala Technologies' *MicroIllustrator* graphics software. *The MicroIllustrator* system boots to a command display from which all functions of the software may be accessed. Each option, from pen color to mass-storage type, is represented on the menu grid in the form of a diagram consisting of labeled symbols, or icons, and executed by using the tablet and stylus to point to a particular selection and pressing one of the tablet buttons. Controlling the program in this way eliminates the need for learning an obscure keyboard command syntax and makes it possible to become comfortable with the system in no time at all.

The command menu is divided into three main sectors: a color palette, a brace of cursor shapes, and a wide selection of automatic commands and drawing functions. The particular range of colors available from *MicroIllustrator* will depend on the limitations of the computer you own—and may range from as few as five primary hues in the Apple II plus/IIe version to a full spectrum of 256 shades on Atari and Commodore systems. Refinement of the shades of color available through the main palette is accomplished through a hue submenu, and additional blends, neutral colors, and fill textures are made available through plaiding, or checkerboarding, colors on the primary palette. Cursor shapes range from a very fine point to a broad italic nib, and these have the same effect when used on the computer screen as the equivalent physical objects would on paper. Drawing functions include color fill, plus such conveniences as the automatic generation of lines, circles, disks, and rectangles, mirroring and magnification of an area of the drawing for very fine, pixel-by-pixel work. Except for the lack of an editing function that would allow parts of a drawing to be reproduced or moved about, it is hard to imagine anything the casual user might require that *MicroIllustrator* leaves unprovided for.

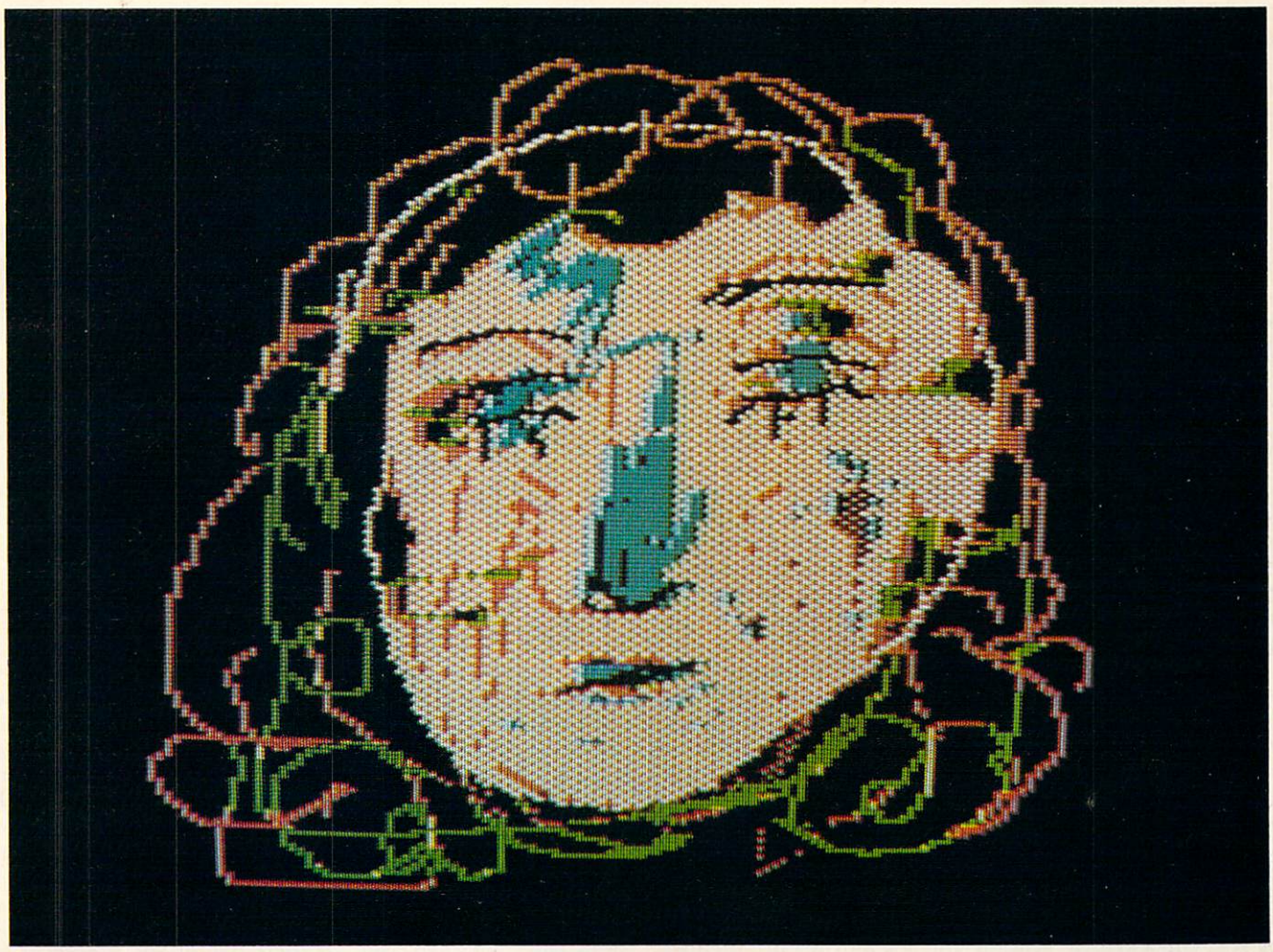
The drawing surface of the KoalaPad is small in comparison to the area of screen it represents; and because it is quite stiff, the enclosed stylus, which focuses pressure in a small area, works better than the finger for most kinds of drawing. The tablet has difficulty resolving the positions of more than one point of contact at a time, and multiple touches, as in finger-painting, tend to produce unpredictable results. In drawing, the width and character of lines on the computer screen depend solely on the shape of the cursor selected, not on the quality of contact with the tablet's surface. In this respect, the KoalaPad system is better suited to line-rendering, draw-and-fill styles, illustration, and cartooning than to painting.

Besides *MicroIllustrator*, Koala Technologies is marketing a full line of Koala-compatible software, including the popular *Spellicopter*, an arcade-action spelling game, *Spider Eater*, a music instruction program, and a version of Logo that features the capability of generating turtle-graphics programs from designs defined with the tablet. Apple and IBM versions of the KoalaPad are excellent joystick substitutes for use with application programs requiring fine screen control, such as Electronic Arts' superb *Music Construction Set*.

POWERPAD/*LEO'S 'LECTRIC PAINTBRUSH*

The **PowerPad** ($99 from Chalk Board, Inc. for the Commodore 64 and VIC-20; Apple; Atari; and IBM computers) is larger than the KoalaPad, its drawing surface

PAUL DAVIS:
A Professional Artist Goes Back to Square One



What happens when an accomplished professional artist tries a totally new and unfamiliar medium? FAMILY COMPUTING asked Paul Davis, a painter and graphic designer best known for his trend-setting posters for New York's Shakespeare Festival, to try out the KoalaPad. Davis and his 16-year-old son, Matthew, hooked it up to their Apple II plus and started scribbling.

"The first thing one tends to try to do is use the stylus as a pencil," says Davis, "which is frustrating since it doesn't have the accuracy or delicacy of a pencil." Yet he found using the stylus pleasing because it allowed him to work on the computer with a familiar type of tool. "It's much easier than trying to draw with paddles or joysticks."

The artist found himself making childlike drawings, as if he were beginning to learn how to draw all over again. "It was like using Crayolas. You pick a color from the box and just draw with it. It was very satisfying, except that I wish I'd had more colors—like the big Crayola box with 72 colors in it." (The KoalaPad's range of colors is more limited on the Apple than on other computers.)

Two assortments of colors are shown in separate sets on the screen, and each set has its own compatibility. "If one mixes colors from both sets, the effects are unpredictable and sometimes weird. For example, I put green from one set on the blue background from the other, and got a purple halo as a result. I liked that.

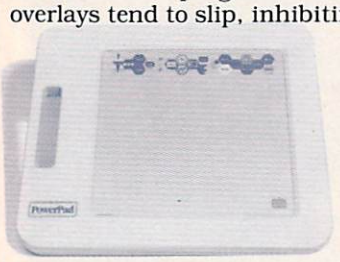
"Matt wanted me to draw something 'more in my style,' but you can't take a new medium immediately and 'do' a particular style with it, because style has as much to do with the medium as with anything else." If the drawing above is reminiscent of the style of another artist, Picasso, Davis explains why. "This medium suggests cubism, being made up of little squares. One is limited to a mosaic-like effect because of the pad's grid. You have to get used to the idea that when you draw a diagonal line you are going to get little 'stair steps' rather than a smooth line, and you have to learn to incorporate that effect."

Exploring a new medium requires going back to the beginning, in order to learn about its special possibilities. The Koala menu offers a variety of modes—LINE, FILL, MAGNIFY, and so on. "Mainly I used LINE for drawing, and FILL for color. I took colors and drew back into them, or erased. It was a little like drawing with electronic crayons, a little like drawing with light—and yet not really like either of these. It is unique, and I still have to find out what else it can do. That's part of the fun.

"I'm beginning to see it as a more flexible medium than I thought it was at first," concluded Davis. "It isn't like sitting down with a pencil, because you are separated from the screen by all these circuits. I can see that, given enough time to play around with it, it could become a very interesting tool for artists."

—MYRNA DAVIS

measuring 12 inches on each side. The unit is best held in the lap or propped against the edge of a table, and a single handgrip on its left side helps steady it in this position. PowerPad is buttonless, so it can't employ the same kind of point-and-select iconic menus as can KoalaPad. Instead, PowerPad software configures part of the tablet's surface as a command key area, allowing for keyboard independence. Each piece of software includes a plastic-parchment overlay for the pad, showing which areas of the tablet control program functions. Unfortunately, these overlays tend to slip, inhibiting freedom of movement over the surface.



With the 'Lectric Paintbrush *users press hexagons for menu-selection.*

Leo's 'Lectric Paintbrush (*LLP*) is the PowerPad's basic drawing software. Available in cartridge format only, it is not included with the purchase of a PowerPad.

The *'Lectric Paintbrush* cartridge boots directly to the drawing screen, where it remains throughout the operation of the program. The command overlay for *LLP* defines a total palette of eight colors and 14 drawing functions, identified, as in the Koala system, by iconic diagrams, not all of which are labeled. Some of these functions, particularly those relating to loading and saving drawings, are difficult to understand just from the overlay's visual cue. Using PowerPad effectively thus requires at least a cursory glance at the clear and simple documentation provided.

Unlike KoalaPad, the PowerPad and *LLP* provide a drawing experience uncannily like painting. The tablet is sensitive to the shape of drawing implements and will distinguish between two or more objects touching its surface at the same time—neatly reproducing the impression of each. Unusual textures and forms can be created by scratching the drawing surface or pressing against it with fingers, fist, or knuckles. Screen colors bleed and spread like pigment and wash to create satisfying effects.

Instead of functions useful for generating line drawings, *Leo's 'Lectric Paintbrush* offers features that allow the user to edit existing graphic images as they are created. The MOVE command defines sections that can be placed anywhere on the drawing field. Additional functions allow such defined images to be reproduced indefinitely at the touch of a symbol.

The single weakness of the PowerPad system is in the way it stores and retrieves drawings to and from tape and disk. As in *MicroIllustrator*, the SAVE option is selected through the tablet itself, in PowerPad's case by pressing the hexagon marked SAVE on the *Leo's 'Lectric Paintbrush* overlay. Having activated the SAVE option, one would expect the system to switch briefly to keyboard control so that the user could select a mass-storage device and choose a file name for the drawing. Not so. The PowerPad system is designed so as to maintain tablet control throughout all phases of operation. Device type is specified by pressing one of two unlabeled hexagons ("#" for cassette, "*" for tape), and file names specified by combining color words from the palette menu. You end up with files called BLUE, BLACK, RED or GREEN, BLUE, CYAN. Amusing, perhaps, but inefficient.

The PowerPad accepts varying signals for lines and shapes.

Additional software for PowerPad is expected to become available shortly. Chalk Board, Inc. has designed a curricular system for its software releases—and programs are in production in six key areas: visual arts, music, mathematics, science, language arts, and social studies.

It's hard to play favorites in choosing between these two systems—both offer considerable value for the money. It's worth noting, though, that the large size of the PowerPad makes this an easier tool for young hands to work with. KoalaPad, on the other hand, offers a variety of sophisticated options, useful even to artists as a graphics tool.

LIGHT PENS

Perhaps you've heard of light pens and wonder what they are. They certainly have an intriguing name. Well, there's nothing magical about them, but they can be very useful tools for computer users.

How can you implement a light pen in your computer system? What do you need to begin? You need, of course, the actual light pen. But, most important is software designed specifically for light pen use, or else the pen will be ineffective. The single most common use of light pens is for menu selection. When a program gives you a variety of options, you can touch the pen to the area of the screen that indicates the option you've chosen. The program will then proceed accordingly. This can be done with almost any light pen, because it requires very low-resolution capabilities. Another important application is with educational software, especially that aimed for the preschool–through elementary school–age groups. Most of these children can't yet read well, so their use of the keyboard is limited. Using a light pen to move objects or to answer questions is much easier for them than keyboard entry.

Light pens have differing shapes, quality, and mechanisms.

Many people want to buy light pens so they can draw directly onto the screen. But you must be careful when buying a pen for drawing. Most light pens aren't sensitive enough to create high-resolution lines. Some will draw low-resolution lines (block-type graphics), which can be suitable for children or some applications, but very few will work in high resolution. With the correct pen and software, however, you can draw directly onto your TV or monitor.

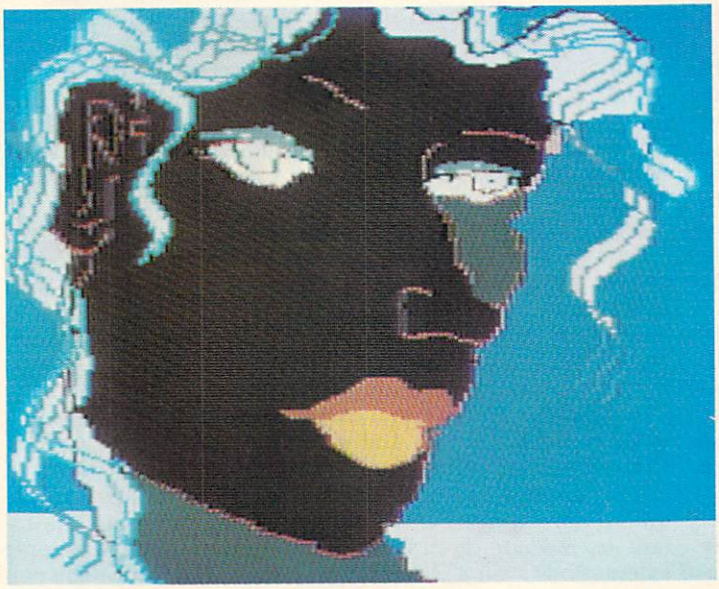
MAKING A CHOICE

The pen you choose should be appropriate for your application. Someone who needs only menu-selection capability can get by with a less sensitive pen. Also, some pens, because of their circuitry, disable certain keys on the keyboard when in use. This is a problem if you must make keyboard entries along with using a light pen in a certain program. The final factor when considering a pen is software. Does it come with any programs to utilize the pen, what do they do, and what other kinds of software exist for that particular pen?

LIGHT PENS vs. GRAPHICS TABLETS

When considering a light pen purchase you should be aware of the differences between light pens and other input devices, such as joysticks or graphics tablets. Joy-

BARBARA NESSIM: The Artist Discovers a New Medium



Barbara Nessim has been a professional artist for more than 20 years, and has worked in a variety of mediums on a wide range of projects. She uses watercolors, pastels, acrylics, and oils, and has produced paintings and drawings for magazines (including the ERA cover for *Time* magazine in July 1982) and advertising agencies, in addition to her own "fine art." In the past few years she has also produced art with computers, which she considers "just another tool."

"My style stays pretty much the same. There's a different set of rules, but that's true of any medium. Instead of getting used to the way paint flows off the brush, you have to get used to the computer and the commands of whatever software you're using. Once that's done, I find it just as gratifying as any other medium. The revealing of the image, and looking at the work itself—that's what's satisfying."

But there is one big difference working with computers, and you can see it in the three drawings shown here [done on a KoalaPad and an Apple IIe]. "One of the nicest things about a computer is that you can do some work and save it; then you can work again on the same piece and save it; then you can bring it to a final point and save that, and have a history of the whole work as it progressed. That's fantastic!

"And, if you take each stage to a certain finished point, you can consider them all completed works. In other mediums, the only person who sees the various stages of an artwork is the artist. No one else knows what's gone into it." —NICK SULLIVAN

sticks usually offer better resolution for drawing. That's because the light pen is dependent upon reading the screen for its data, while the joystick merely reads an internal register. But, drawing by joystick is not as natural as drawing with a light pen. Graphics tablets are another matter altogether. They are as natural to use as a normal pen, and can give good resolution, too. Their one weakness is that the drawings you execute on them are smaller than the actual screen image. Although that's not always a problem, be aware that it can be. And, for menu selection, the light pen is the easiest of the devices to use.

If you're careful in your consideration of what light pen to buy, you will find it to be a powerful peripheral.

FIVE MAJOR PENS FOR FIVE COMPUTERS

If you have an Atari, Commodore, Apple, or IBM, at least one company makes pens for your computer. The prices charged vary from as low as $29.95 to more than $100. In all cases, they include several programs that use a light pen to control the computer. You can buy additional software from companies other than the pen manufacturer.

For instance, Cardco, Inc. has a light pen called **Cardriter,** for the Commodore 64 and VIC-20, that sells for $39.95. This low-resolution light pen, with an on-off button on its side, can be used only for menu selection or very simple games. It comes with several programs, including a *TIC-TAC-TOE* game. It can't be used for screen drawing. Of the five pens evaluated here, the Cardriter had the lowest level of performance, at a relatively high price.

Another low-resolution pen is the **LP-10** from Tech-Sketch, Inc. Much slimmer than the Cardriter and easier to hold, it gives a relatively stable signal and can be used for menu selection or controlling shapes for games and educational programs. It comes with software on tape or disk, including *Paint & Sketch*, a drawing program. Tech-Sketch offers a full line of pre-school learning games that use a light pen to move, indicate, and play. The LP-10 is a good low-resolution pen, and is much cheaper than the other Tech-Sketch light pen, the LP-15.

The **LP-15,** a high-resolution pen, is larger than the LP-10, but smaller than the Cardriter. It is capable of both high- and low-resolution work, and also comes with *Paint & Sketch*. The LP-15 is a good sensitive pen, with software support from Tech-Sketch. At $119.95, however, it's the most expensive of the five pens. And Apple users will need an additional card that costs $100.

The **Edumate Light Pen** from Futurehouse is a new, low-cost, high-performance light pen. Costing only $29.95, it performs as well as the more expensive Tech-Sketch LP-15. It's the slimmest of the five pens, and comes with a disk with programs including a high-resolution one for screen-drawing. The C 64 version also has a *TIC-TAC-TOE* game, a sound generator, and a file-copying program. The keyboard is used to turn it on and off.

Finally, there is the **Madison Light Pen,** made by the Madison Computer Company. This is an attractive, high-resolution pen, which rests in a wooden base when not in use. It has no buttons, but does have a sensitivity control on the base. It comes with a disk that includes a game, a file-copying program, and a drawing program. It gave the most stable and reliable values of the pens tested and was superior in performance, appearance, and software.

HOW IT WORKS

A light pen is a position detector, approximately the size of a fountain pen, which contains a light-sensing device (a phototransistor). When placed on the screen it transmits a signal to the computer that can be interpreted as an x,y coordinate pair. This x,y value indicates a location on the screen, which can be a large area (from one to several character blocks) or a very small point (such as a single pixel). The program uses that value to determine what the user wishes to do.

To understand how a light pen works you need to know how your screen's video image works. The electron gun (cathode-ray tube) generates a beam of electrons, the intensity of which depends upon the voltage supplied. The beam is aimed by deflector plates in the picture tube, and travels systematically, from the upper-left portion of the screen, moving horizontally to the right. When it gets to the end of the scan line it jumps back to the left side, one scanning line beneath the last. When it reaches the bottom of the screen, it returns to the top left. This usually occurs 60 times per second. The intensity of the voltage supplied to the cathode-ray tube is dependent upon the image needed at a particular location. For instance, one volt would signify a dark image, and three volts would be white. Intermediate voltages would be expressed in shades of gray. As the screen image changes, the voltage alters to produce the new image.

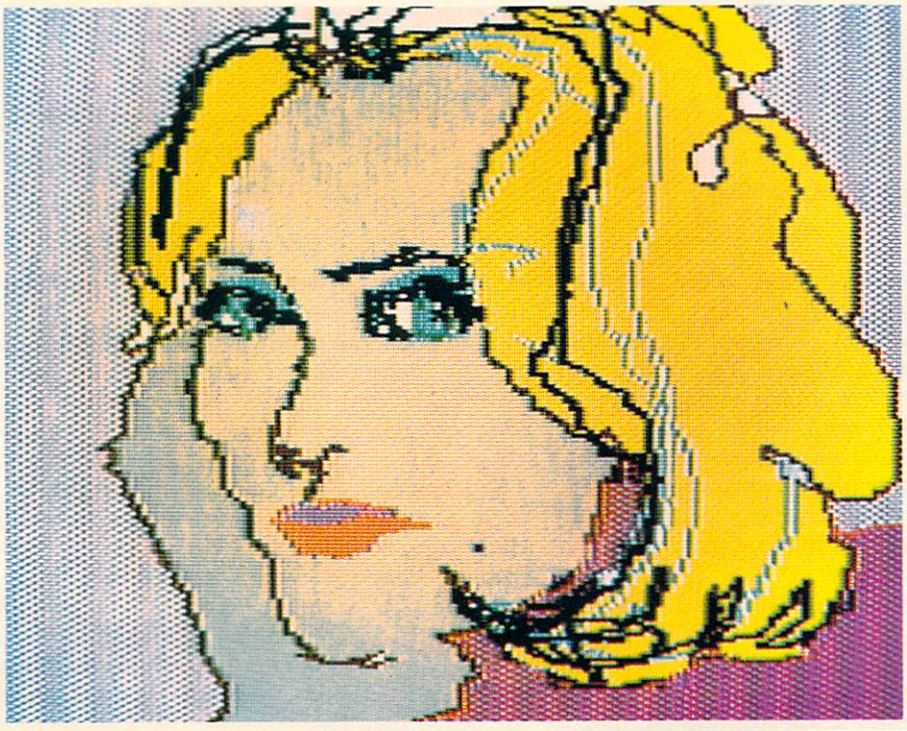
Now to the light pen. The phototransistor inside the end of your light pen is sensitive to light. When the electron beam strikes the display, it causes a phosphorescence, or light. This light is detected by the phototransistor, which then sends a pulse to the computer. Most microcomputers have two light pen registers, one for the x coordinate and one for the y. The y signal corresponds to the line the pen is currently scanning, and the x signal indicates how far to the right the pen is from the beginning of the scan line. (The scanning process for one line takes 63.4 microseconds!) For an eight-bit microcomputer, these signals result in a value from 0 to 255. By doing a few simple calculations, you can tell what column, line, or (if the pen is sensitive enough) even what pixel the pen is on.

This information is fed back to the computer via the light pen registers and used by the program to decide what to do. With just a little practice, you can write your own programs utilizing your light pen.

FIVE POPULAR LIGHT PENS

Manufacturer	Model	Price	On-Off Switch?	Resolution	Computers	Software Supplied?	Keyboard Disabled?	Overall Performance
CARDCO (316) 267-6525	Cardriter	$39	Y	L	Atari, C 64, VIC-20	Y	N	Average
FUTUREHOUSE (800) 334-7638	Edumate Light Pen	$29	N	H	Atari, C 64, VIC-20	Y	Y	Good
MADISON COMPUTER (608) 255-5552	Light Pen	$49	N	H	Atari, C 64, IBM PC, VIC-20	Y	N	Excellent
TECH-SKETCH (800) 526-2514	LP-10	$39	Y	L	Apple, Atari, C 64, VIC-20	Y	N	Average
TECH-SKETCH (800) 526-2514	LP-15	$119	Y	H	Apple, Atari, C 64, VIC-20	Y	Y	Good

KEN AND ROBERTA WEINER:
Graphic Artists on a Graphics Tablet



Like most artists, I regard anything invented after 1840 with suspicion and fear. But I would never admit that I was scared of a mere computer. So when I dropped by FAMILY COMPUTING's office to try out the Koala-Pad on the Commodore 64, I gritted my teeth and took a deep breath.

It was easy! It took less time to set up the computer than it takes to set up an easel. I inserted a floppy disk, typed a few words on the keyboard, and was ready to go.

With its special functions the Koala is much more than a video version of Etch-a-Sketch. It takes a while to get used to drawing with the stylus on a graphics tablet while watching the picture develop on the CRT. It's like patting your head and rubbing your belly at the same time, but I got used to it after a minute or two. I became a full-fledged computer artist in less time than it took to stretch a canvas.

It was fun! The Koala system combines two of my favorite pastimes—sketching and watching TV. Time flew as I created one masterpiece after another, until the pupils in my eyes felt like the little square pixels that composed the pictures.

I returned the next day with my wife, Roberta, who is also a graphic artist. Roberta learned the system in less time than I did. We both agreed the Koala, although a toy compared with the more sophisticated computer-graphics systems available to artists, could be an important tool for the graphic artist. It eliminates the need for the preparatory sketches that often fill our wastebaskets before we begin a painting. Colors can be applied and changed in seconds. The versatility of the system frees the imagination. Ideas seem to be magically projected from the mind directly onto the screen. Best of all there are no smelly solvents, messy tubes, brushes to clean, or pencils to sharpen.

—KEN WEINER

A Novices' Guide to Programming LaNgUAGes

TO MAKE A COMPUTER WORK YOU NEED A PROGRAM. TO WRITE A PROGRAM YOU NEED TO KNOW A LANGUAGE.

BY KENNETH P. GOLDBERG

If you own a microcomputer, there are three basic ways you can use it: You can buy and use ready-made software or prerecorded programs; you can write your own programs; or you can do a little of both. If you plan to do some programming of your own, either because you can't find commercial software that does exactly what you want or just for the challenge and enjoyment of it, there may be a programming language that is specifically suited to your purposes.

A programming language, just like a spoken language, is a set of rules that allows you to communicate—in this case, with a computer. For the computer to understand the language you use—be it BASIC, Pascal, Logo, etc.—that language must first be loaded into the computer's memory.

Most microcomputers come with the BASIC language built in and will understand a BASIC program. To write and run a program in another language, you must purchase that language and load it into the computer's RAM. These languages usually come in the form of a card, or circuit board, which fits into a slot in the computer, or on a disk, which is loaded into the computer like any other program.

Following are descriptions of several commonly used programming languages that are available for microcomputers, along with brief explanations of how they work and what they are best suited for.

KENNETH P. GOLDBERG *is chairperson of the Math, Science and Statistics Education department at New York University. He is the author of* Microcomputers: A Parents' Guide *(John Wiley & Sons) and* The Parents' Book on Calculators *(Oxford University Press).*

BASIC—*A beginners' general-purpose language*

BASIC

BASIC (Beginner's All-purpose Symbolic Instruction Code) was developed at Dartmouth College in the mid-1960s to allow people who were not computer specialists to make use of the power of the computer. Whereas it might have taken a programmer months or even years to become proficient in the computer languages that were available before the development of BASIC, a nonspecialist can probably write useful programs in BASIC after only a few days of practice, and fairly sophisticated ones after only a few weeks or months.

For those who quickly master BASIC, some computers (TRS-80 Color Computer and TI-99/4A) offer Extended BASIC, which is slightly more powerful and allows you to write programs with sophisticated graphic displays.

BASIC has a relatively small number of commands (statements that tell the computer to execute certain steps), most of which are very similar to English words and statements. Thus, they are easy to learn and remember. To understand BASIC's commands, the computer has an internal translator that turns BASIC into the computer's own language, or machine language.

This translator is called an interpreter. Interpreters can be fairly slow, so people who want their programs to be executed faster often buy a compiler. This translates BASIC commands into machine language more quickly.

Even though BASIC sounds like English, you can't use just any English words or phrases, but only those that the "phrase book" has listed. For example, you can tell the computer to display the word *computer* on its monitor using the command PRINT "COMPUTER", since PRINT is an acceptable command. But you can't do it by typing WRITE THE WORD COMPUTER ON THE MONITOR, because that command is not in the phrase book.

```
10  HOME
20  FOR A = 1 TO 1000000
30  PRINT A;
40  NEXT A
50  HOME
60  PRINT "ALL DONE!"
```

This BASIC program counts from 1 to 1,000,000 (displaying all the numbers on the screen), and then prints ALL DONE!

While BASIC has never been thought of as the best language for young children (see Logo for one that is), there is now some question whether BASIC is an appropriate first language for any programmer. The very thing that makes BASIC easy to learn in the first place—its small number of commands—sometimes makes it difficult to write sophisticated programs in a straightforward manner. As a result, many education experts contend that BASIC is difficult to use and teaches bad programming habits that interfere with learning more advanced languages.

For the time being, however, BASIC is still the language that comes with most computers, and for that reason remains the most common first language. In many cases, it is the only language computer users ever learn.

LOGO—*An educational graphics language*

LOGO

Logo is an education-oriented language aimed specifically at the elementary school–age child. It was invented by Seymour Papert, a professor at the Massachusetts Institute of Technology, in the 1960s. The first microcomputer it was developed for was the TI-99/4, but it is now available for many computers, including the Apple, Atari, Commodore, IBM, Texas Instruments, and TRS-80. There are several versions for the Apple and IBM.

The educational philosophy of Logo is to provide a learning environment, which Papert has designated "Mathland," in which young children can explore, experiment, and thereby learn about computers, mathematics, and their own thinking processes.

Central to this philosophy is Logo's graphics capability, called "turtle graphics" because the original version of Logo allowed children to use a computer to command a mechanical object on wheels that looked like a turtle. In the current versions of Logo, the turtle is an object on the computer screen rather than an actual mechanical object.

The screen turtle can be made to move and turn by using a simple vocabulary of words—FORWARD, BACKWARD, RIGHT, and LEFT—each followed by a number. The number following FORWARD and BACKWARD tells the turtle how many "turtle steps" to move in either direction, respectively. The number following RIGHT and LEFT tells the turtle how many degrees to turn in either direction. As the turtle moves, it leaves a trail in one of several possible colors, and it is this trail that creates drawings and designs. For example, the command REPEAT 4 [FORWARD 50 RIGHT 90] tells the turtle to move forward 50 steps and turn 90 degrees to the right, and repeat this four times. The drawing created by this command would be a square with sides the length of 50 turtle steps.

```
TO HISTOGRAM :LIST
IF EMPTYP :LIST
[PR [TASK COMPLETE.] STOP]
MAKE "NUM FIRST :LIST
MAKE "LIST BUTFIRST :LIST
TYPE :NUM STARS :NUM PR []
HISTOGRAM :LIST
END

TO STARS :NUM
IF EQUALP :NUM 0 [STOP]
TYPE "*
MAKE "NUM :NUM - 1
STARS :NUM
END
```

This Logo program creates a histogram, a type of graph.

Several versions of Logo also include "sprites," invisible "creatures" that can be given different shapes and colors and set in motion to provide realistic and impressive animation. As the children try to "teach" the turtle and/or sprites to move around and draw pictures, they automatically learn about such concepts as direction, distance, motion, shape, and color.

In addition to graphics, Logo also provides arithmetic and list-processing capability. While the computational capability is not as extensive as that provided in BASIC or some other languages, it is more than sufficient for schoolwork, household finance, and simple business applications. List processing allows the user to create, store, and manipulate lists of numbers, words, and sentences.

Logo is adapted from the language LISP (LISt Processing), which has only list-processing capabilities and no graphics. LISP is used in artificial-intelligence research as a language that allows a computer to mimic human behavior. List processing is very useful for this purpose because it allows the computer to be given a store of basic English phrases that it can manipulate and modify as it holds a seemingly human "conversation" with a human being.

List processing does allow for the recording, modification, and manipulation of text material such as names, addresses, and inventory, so versions of Logo developed for a business computer like the IBM PC stress list processing. But for the average computer owner, the chief attraction of Logo is its graphics capability and educational uses rather than its list-processing applications.

Unlike BASIC, Logo is what is called a "modular language," because it allows complicated problems to be broken down into simpler modules, or components. These can then be solved independently of each other and recombined for a solution to the original problem. Pascal, a language that is very popular at colleges, is also a modular language. Because of this, many educators now feel that Logo is a better first computer language for children than BASIC. Logo teaches good programming habits, and the translation from Logo to Pascal is much easier than from BASIC to Pascal.

If education is of primary concern to you, either to allow your children to explore and learn about mathematics, computers, and graphics on their own, or to keep up with the possible use of Logo in their school, Logo may be a useful language for you to own.

PILOT—*A learning and teaching language*

PILOT (Programmed Inquiry, Learning, Or Teaching) is an authoring language designed expressly to allow for the easy creation of computer-aided-instruction (CAI) programs. In these, information is presented and questions are asked; the user responds; and the program branches to one of several alternatives depending on the response given.

Although PILOT was originally designed to be used by educators, its ease of use and excellent graphics capability also make it of possible interest to noneducators who want to develop educational programs for their children or who just want an easy way to create computer games that combine text with graphics.

This Pilot program sets up a little quiz, asking the user to "name a product exported by Brazil."

```
10   T: TODAY'S TEST QUESTION IS ON BRAZIL
20   T:
30   T: NAME A PRODUCT EXPORTED BY BRAZIL
40   T:
50   A:
60   M: COFFEE RUBBER GEMS
70   T:
80  TY: CORRECT.  VERY WELL DONE
90  TN: SORRY.  BETTER LUCK ON TOMORROW'S QUESTION
```

In PILOT, each program line begins with a code letter (or two) that tells the computer what to do with the rest of the line. For example, "T:" at the beginning of a line tells the computer to "type," or display on the screen the message that follows. Similarly, "C:" tells the computer to "compute" the mathematical expression that follows; and "M:" tells the computer to expect an input from the user and look to see if this input "matches" any of the words that follow.

The "M:" code is especially useful in the authoring of educational programs. For example, suppose you want to ask the user to name one of the products exported by Brazil. You will accept either "coffee," "rubber," or "gems" as being correct. The command M: COFFEE, RUBBER, GEMS will look at the user response and accept any one of these three words as correct.

This automatic coding of program lines frees the programmer from having to tell the computer *what* to do with each line, so that he or she can concentrate on the *content* and *design* of the program.

PILOT is relatively easy to learn, even for the novice, and allows the user to begin authoring CAI programs almost immediately. One drawback of PILOT is that it executes, or "runs," the program more slowly than some other languages. This is because the computer must "decode" the code letters at the beginning of each line as it runs through the program. However, this is what you give up for the ease of development PILOT offers. And, since the difference in execution speed is only a matter of seconds, it isn't very noticeable.

PILOT is available for several of the more popular computers. The Atari, Apple, and Commodore versions contain turtle-type color

graphics very similar to those offered in Logo. They can be used alone, or in conjunction with the text and computational capabilities of the language to produce very sophisticated instructional programs.

If you want to create instructional programs, PILOT is specifically designed to help you do this easily and well. But if you have some other application in mind, stick to BASIC or some other language more suited to that task. You may be able to do it with PILOT, but probably not as easily or as well.

PASCAL—*A classic structured language*

Pascal, named after the 17th-century French mathematician Blaise Pascal, is a "structured" language. This means that programs in Pascal must follow certain built-in rules of "good programming" or they will not run.

For example, a program in Pascal must begin with the word PROGRAM followed by the name of the program; it must then have the word VAR (for variable) followed by a list of all the names of items that will be used in the program; it must then have the word BEGIN followed by the actual commands of the program; and, finally, it must have the word END to tell the computer the end of the program has been reached.

Pascal, as noted before, is a modular language that allows complicated problems to be broken down into simpler modules. For example, suppose a numerical problem requires a different method of solution depending on whether all the numbers involved are positive, all the numbers involved are negative, or the numbers involved are of both types. Individuals or teams can be assigned to work independently of each other on the three problem types, and their respective solutions can then be assembled to form a complete solution covering all three possibilities. Any of these modules can then later be modified or even removed without affecting any of the others.

While Pascal is not as easy to learn as BASIC, once it is learned it allows for more powerful and efficient programs, programs that run faster and are easier to modify. Because of these desirable characteristics, Pascal is fast replacing BASIC in many colleges as the first programming language taught and is being

```
PROGRAM ADDSUB;
   TYPE MATH =(ADD);
   VAR CONST1, CONST2, RESULT : INTEGER;
       OPERATION : MATH;
   BEGIN
      CONST1 := 5;
      CONST2 := 7;
      OPERATION := ADD;
      IF OPERATION = ADD THEN
      BEGIN
         RESULT := CONST1 + CONST2;
         WRITELN('THE ANSWER OF 5+7 IS ', RESULT)
      END
   END.
```

To add 5 and 7 in BASIC, you merely have to type, PRINT 5 + 7. *To add 5 and 7 in Pascal, you need a lengthier program, such as the one shown here.*

PASCAL CHOSEN FOR AP EXAM

While BASIC is the "native language" of most home and personal computers, as well as the cornerstone of computer literacy, its preeminent position may be in jeopardy. Pascal was the language selected for the first computer science advanced placement (AP) exam, to be given this May. As a result, high schoolers wanting a jump on college computer courses will have to master Pascal.

AP exams allow high school students to earn some college credit for their work in such subjects as English, history, calculus, and music. In participating high schools, students take special courses that are equivalent to introductory college classes, as determined by committees of college and high school instructors. The committees also develop course guides and exams.

Approximately 6,000 high schools are preparing students for the AP exam in computer science this year, according to Anne Grosso, a spokesperson for the College Entrance Examination Board (CEEB), which develops AP exams. As yet, no one knows how many students will actually take the standardized computer science test, but estimates range from 3,000 to 12,000. (Last year 51,000 students took the English literature and composition exam, while only 600 vied for credit in music.) The newest three-hour exam will consist of two parts: one with multiple-choice questions; the other presenting a situation or problem that requires students to write a computer program in Pascal.

Some educators have challenged the decision to base the exam on Pascal, since BASIC is more commonly taught in high schools. In addition, the choice may create a new class of haves and have-nots—those attending schools that offer Pascal instruction and those who don't. Yet the CEEB says the planning committee polled 200 colleges and determined that Pascal is more widely taught than BASIC. Harlan P. Hanson, the CEEB's AP Program Service Officer, says: "It would be dreadful if what [students] were doing in high school had no relation to what followed in college."

—LINDA WILLIAMS

adopted for business applications as well. Pascal has also been chosen as the programming language to be used in the advanced placement (AP) examination in computer science for high school students going on to college [*page 57*].

One minor drawback of Pascal is that, unlike BASIC and Logo, it cannot be used to write statements that will be carried out immediately by the computer. For example, in BASIC, the command PRINT "BLAISE PASCAL" will cause the computer to immediately display the name BLAISE PASCAL on its monitor as soon as the command is entered. No such immediate execution is possible in Pascal. Instead, you would have to write a program commanding the computer to print the name and then tell the computer to run the program.

This is a very minor drawback, however, since the vast majority of applications to which a computer language is put involve programs that will be used over and over again, rather than for the immediate evaluation of a mathematical expression or the immediate printing of a message on the display screen.

Pascal might be a good language to own if you have a college student in your family or a high school student who plans to go to college. It is also the right language for anyone who intends to do serious programming and wants the advantages Pascal offers over BASIC in programming efficiency, speed of execution, and ease of modification.

MACHINE LANGUAGE—*The computer's native language*

Machine language lets you communicate directly with the computer. It is the language the computer understands. The commands are composed of binary digits, i.e., strings of 0s and 1s. Machine language uses very little memory space, gives you total control of the color and sound capabilities of your computer, and can be executed very fast. This is because the computer does not have to internally translate your commands, as it must with so-called high-level English-like languages—BASIC, Logo, PILOT, and Pascal.

There are easier ways to add 5 and 7 than writing a program in machine or assembly language. But we did it anyway, just to show what the languages look like.

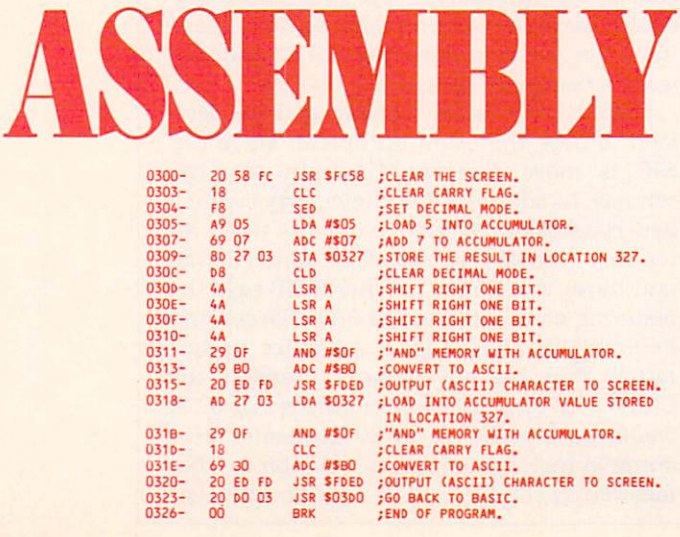
If, for example, you write a program telling the computer to count to one million and then display the message I'M DONE, a program written in machine language would do this at least a thousand times faster than an equivalent BASIC program. For this reason, many fast-paced action games are written in machine language.

In spite of its speed of execution, however, machine language is relatively difficult to learn. And it's not hard to make mistakes, because the programmer must tell the computer exactly what to do every step of the way, with no shortcuts from a built-in "phrase book."

For instance, to write a program in machine language to add 5 and 7, you have to tell the machine 1) to put the first number, 5, in a specific memory location; 2) to put the second number, 7, in another memory location; 3) to take each of the numbers out of their memory locations and put them in a special computation location; 4) to perform the operation of addition and place the result in a specific memory location; and finally 5) to take the sum from its memory location and display it on the screen.

In BASIC, by comparison, all you need to do is give the command PRINT 5+7, and the computer automatically does everything else. Machine language is certainly a language for the advanced programmer.

ASSEMBLY —*The user-friendly "machine" language*



ASSEMBLY —*The user-friendly "machine" language*

Assembly language lies somewhere between machine language and the high-level languages. It does everything machine language does, but you can use English words and abbreviations to stand for machine instructions and memory locations, instead of figuring out the strings of 0s and 1s. Again, many games are written in assembly language.

Assembly uses mnemonics that hint at what the commands mean, such as CLR to "clear," or empty, a specified memory location; and SWP to "swap," or switch, the contents of two specified memory locations. Because of these features, many nonprofessional programmers choose assembly language over machine language.

FORTH—*A "mid-level" language*

FORTH was developed in the mid-1970s as a way of using the computer to run other machinery, and for business applications with the exception of large-scale numerical computation. It is one step closer to the high-level languages than assembly, with some of the benefits of each. FORTH is becoming much more popular and might be worth looking into if you want a programming language that is faster in execution and more flexible in programming capability than Pascal and BASIC—but not as difficult to learn, or as easy to err with, as assembly.

Interestingly, a recently announced low-priced computer (list price is approximately $150) called the Jupiter Ace has the FORTH language built into it instead of BASIC. This is an interesting development and might herald the appearance of computers with a language other than BASIC as a standard feature.

```
0 ( PRINTS HISTOGRAM OF VALUES ON STACK)
1 ( INITIALIZE ::)
2 0 VARIABLE SP0
3 SP@ SP0 !
4 : DEPTH SP0 @ SP@ - 2 / 1 - ;
5 : STAR 42 EMIT ;
6 : STARZ CR DUP . 0 DO STAR LOOP ;
7 : HIST DEPTH 0 DO STARZ LOOP ;
```

This FORTH program, like the Logo program shown earlier, also creates a type of graph.

FORTRAN—*A scientific language*

FORTRAN (FORmula TRANslator) is a scientific and engineering language originally designed to simplify the programming of algebraic formulas and other mathematical operations. It is extremely computation-oriented. Much of FORTRAN is similar to BASIC, since BASIC is essentially a simplification of FORTRAN for the nonprofessional. However, FORTRAN makes more demands on the programmer than BASIC by requiring such information as whether the numbers being used are integer (5) or "floating point" decimal (5.0); how many places each has after the decimal point if they are decimal; and the form in which numerical results are to be returned. This gives the mathematical programmer more flexibility and choice, but is an added burden for the ordinary programmer. Such information is not required in BASIC, Logo, or PILOT; with a few exceptions, it's all taken care of automatically. FORTRAN is a powerful language for the specialist in mathematical programming, but not really very useful for the average computer user.

```
      LET COUNTER = 0
      DO 10 COUNTER = 1,100
         PRINT,COUNTER
10 CONTINUE
      STOP
      END
```

COBOL—*A business language*

COBOL (COmmon Business-Oriented Language) is a business language developed in large part through the efforts of Grace Murray Hopper of the Department of Defense. It is strong in areas important to business applications, such as large-scale data manipulation, the generation of reports, and the input and output of information, but it is weak in complex mathematical computations (where FORTRAN is strong). COBOL is a well-established language for large-scale business applications, but, again, not desirable for the novice.

```
IDENTIFICATION DIVISION.
PROGRAM-ID.  'DEMO'.
ENVIRONMENT DIVISION.
DATA DIVISION.
PROCEDURE DIVISION.
    PERFORM
    INITIALIZE-COUNTER.
    PERFORM DISPLAY-PARAGRAPH
    THRU COUNT-PARAGRAPH-EXIT
    UNTIL COUNTER > 100.
    STOP RUN.
INITIALIZE-COUNTER.
    MOVE 0 TO COUNTER.
DISPLAY-PARAGRAPH.
    DISPLAY COUNTER.
COUNT-PARAGRAPH.
    COMPUTE COUNTER =
    COUNTER+1
COUNT-PARAGRAPH-EXIT.
EXIT.
```

Both the FORTRAN and COBOL programs shown here count from 1 to 100. Unlike a BASIC program, which puts the results right onto the computer screen, you won't see the countdown unless you enter a command asking for a screen display.

AVAILABILITY

Of these languages, the most widely available for popular microcomputers, besides BASIC, is Logo. For all micros except the Timex, you can find at least one version, ranging in price from $50 to $200. And, soon, there will be a version for Timex as well.

PILOT is available for Atari, Commodore, and Apple computers, and Pascal for Apple, IBM, Texas Instruments, Atari, and Radio Shack computers. Pascal, however, is not cheap. You can pay from $250 to $1,000, depending on the computer model you own.

For information on FORTH, call or write the FORTH Interest Group (P.O. Box 1105, San Carlos, CA 94070; (415) 962-8653). FIG's bimonthly magazine, *Forth Dimensions*, carries lists of FORTH products and vendors; subscription is free with membership in FIG ($15). For information on the Jupiter Ace computer, which has FORTH built in, contact Computer Distribution Assn., 17 S. Main St., Pittsford, NY 14534; (716) 385-6277.

Better Safe Than Sorry...

HOW TO PROTECT YOUR COMPUTER INVESTMENT

BY JANE WOLLMAN

PROTECTION UNDER MOST HOMEOWNER AND TENANT INSURANCE POLICIES IS USUALLY FAR FROM ADEQUATE.

The culprit might have been Scooter or Streaker or Trigger—or any of the six pet cats owned by Susan and Douglas Hemming of Pasadena, California. Nobody knows just who was responsible. The fact is, nevertheless, that one of their furry little friends had suddenly turned the couple's computer software container into a kitty litter box. Upon opening the plastic case—which had perforations around the handle—Douglas discovered that $300 worth of disks were thoroughly soaked.

He tried washing the programs in warm water, allowing them to dry for almost a month. The disks worked for a little while, but then started to deteriorate one by one. Everything—the word-processing program, the computer games, a complete supply of blank disks—was ruined.

Fortunately, all that damage did not spell disaster for the Hemmings, who had had the foresight to take out special insurance protecting against loss or destruction of their four home computers and mushrooming software collection. This meant that the insurance company would pay them nearly the full replacement cost of the entire box of spoiled disks.

Most standard homeowners and apartment tenants insurance policies—protecting your house and personal property—include coverage for computer systems and software in the event of loss caused by certain perils, such as fire, theft, and vandalism. But coverage is limited. Computer claim-settlement payments are low. In addition, because of the computer's particular vulnerabilities, protection under these plans usually is far from adequate. For example, typically, a homeowners contract fails to cover damage resulting from power surges—fluctuations in the electrical line sometimes triggered by lightning or brownouts—which can destroy computer components and damage software. They also often ignore accidental damage—stemming from, say, your child's tripping on a cord and toppling over the computer; and loss generated by pets—such as the Hemmingses' catastrophe.

Most conventional homeowners policies also fail to cover the contents of a software disk—whether the program is store-bought or developed by you from scratch. All that is insured is the physical medium on which the instructions are recorded. Furthermore, a computer purchased for operating a home-based business isn't protected since no equipment used for this purpose is covered in the customary homeowners plan. And while some policies do provide coverage for a computer employed for incidental business applications or for occasional moonlighting, many homeowners contracts make no provision at all for computers used to perform business functions.

NEW POLICIES

Recently, several insurance companies have brought out special policies, as well as extensions (called endorsements) to homeowners plans that address the unique nature of computers as household property. They also provide for higher settlement payments if a loss occurs. In contrast, traditional endorsements—commonly called "floaters"—which are purchased to boost coverage on items such as furs or jewelry, usually are unavailable for home computers and, when they are, may carry high premiums. But the homeowners computer endorsements, typically available through local insurance agents, sometimes can be tacked on at no extra cost; in other cases, a small addition to the annual premium is required. Cost for the special separate computer policies start at $25 a year.

Some companies, such as State Farm Fire and Casualty Co., now offer specific computer coverage, at no additional charge, as an optional endorsement to its regular homeowners policy. The company provides for up to $3,000 coverage on hardware and commercially available software programs, whether your computer is bought for personal use or to run a business at home. As with most of the new plans protecting computers, claim settlement is made on a more liberal "replacement cost" basis—the amount necessary to replace your computer with a new machine of similar functions and capabilities. This can be much preferable to a "cash value" basis, common in

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ILLUSTRATION BY NICK JAINSCHIGG

homeowners policies, where payment is set according to the amount your computer is worth at the time of loss—i.e., replacement cost less depreciation.

Other companies are automatically giving special consideration to computers *within* the standard homeowners policy, as well. Nationwide, for example, provides for up to $3,000 coverage on hardware and both store-bought software and programs you create. If an income tax program you've developed is destroyed, the company will likely reimburse you with an amount equal to the price of a similar piece of software available commercially. Some insurers, however, allow for a more generous negotiated settlement based on your time and skill in producing the program. Chubb Group, for one, has a comprehensive homeowners policy—costing about 10 percent more than its basic plan—that provides for up to $5,000 in coverage for re-creating original personal-use software.

ONE OF THE CATS HAD TURNED THEIR COMPUTER SOFTWARE CONTAINER INTO A KITTY LITTER BOX.

WHAT CAN GO WRONG?

Another way some of the new provisions broaden protection against the unexpected is by providing "all risk" coverage: You're insured for *any* peril (including fire, theft, and accidental breakage) *except* those—such as wear and tear, insects, and earthquakes—specified in the policy.

ESPECIALLY FOR COMPUTERS

Perhaps the most revolutionary move in home computer insurance is the development of low-cost policies designed solely for systems and software. This means you can acquire broad computer coverage without having to take out a homeowners or tenants contract, which is often an expensive investment. The policies range widely in cost—generally starting at around $200 a year.

Safeware, of Columbus, Ohio, a new insurance agency handling only computer-related coverage, offers individual policies insuring home computers used in both personal and business applications. As with most insurance coverage, there are trade-offs: while Safeware doesn't insure software you've created yourself, it does cover damage resulting from, say, your six-year-old's dropping a gob of ice cream into the computer, or from Rover's misdeeds.

Most of the new computer insurance now available automatically protects equipment you may acquire after signing up for coverage. Should you, however, need heavier insurance at a later date, even some of the "no-cost" policy endorsements include provisions for increased coverage. State Farm, for instance, offers an additional $5,000 in protection for $15 a year. Beyond that, if you're in business, perhaps, and require broader coverage, you can always take out a commercial policy, which is usually more expensive.

Another point you might keep in mind

PERHAPS THE MOST REVOLUTIONARY MOVE IN HOME COMPUTER INSURANCE IS THE DEVELOPMENT OF LOW-COST POLICIES DESIGNED SOLELY FOR SYSTEMS AND SOFTWARE.

SECURITY SET-UPS

As many owners of car stereos have unfortunately come to realize, the increased popularity of the item has led to an increased number of thefts. The same unpleasant truth is now a concern of those who have put computers into their homes.

Taking measures to protect your costly computer from theft is obviously a sensible idea, and there are a number of devices designed to do the job. They range from centralized home-intrusion systems and burglar alarms to special items made expressly to lock up or bolt down the computer and its accessories.

One of the more sophisticated security devices on the market is the Sensaphone ($250), made by **Gulf & Western Industries'** Advanced Development and Engineering Center. Hooked up to your telephone, it works by constantly monitoring your home for a number of conditions, including unusual sounds. During an attempted burglary, the system will automatically dial up to four phone numbers you've programmed into the device. Once a connection is made, the Sensaphone summons help by stating—in an electronically synthesized voice—a predetermined code that signifies the source of trouble. A specialized device to protect computers is the Equipment Guard CP ($166), from **Stajer Corp**. It combines a multiple electrical outlet strip with a burglar alarm in one unit. The computer cord is plugged into the strip, which is placed in the wall socket. Then, should a would-be thief remove the cord, the system will set off a loud wail.

There are a variety of options for securing the computer to a desk or table. One is to use heavy cables and padlocks. Rather than drilling holes in your equipment, some of the cables simply require gluing a rubber disk to the computer with strong epoxy.

Also available are special adhesive pads for attaching the machine to a surface. **Anchor Pad International**, for example, makes one it claims "takes more pulling power than the starting lineup of the L.A. Rams to move." The device ($130–$445, depending on computer model) is installed by bolting a metal base to the bottom of the computer and inserting two steel rods that interlock the base with the adhesive foam mat, which is stuck to your desk. Locks placed in the base prevent the rods' removal.

In addition, special cabinets can be purchased to secure your computer and peripherals. The Pro-Tech locking stand ($155), made by **Seagull Enterprises**, is designed for the Apple II, II plus, and IIe computers. Bolted to a desk, the stand leaves the keyboard exposed so that the computer remains accessible.

Another steel locking cabinet ($249), is available from **Inmac**, a mail-order company in Santa Clara, California. It's designed for the IBM PC and completely encloses the machine and its separate keyboard. It also comes equipped with a built-in surge arrestor to protect against electrical power surges that can damage both computer and software.

For help in solving specific equipment and data-security problems, you can join the **Computer Security Institute** (43 Boston Post Rd., Northboro, MA 01532). For an $85 annual fee, you're provided with telephone hot-line service and a subscription to the organization's bimonthly newsletter. —J.W.

when considering insurance is whether the policy of endorsement has a settlement deductible clause, and what that fee is.

Even when you're protected by the proper computer insurance, some preventive measures are well worth taking to avoid potential problems and aggravation. For one, be sure to make backup, or duplicate, copies of your software programs. If they are particularly valuable, store the clones in a bank safe-deposit box. Another smart move is to buy a power-surge protector—fitted between the computer plug and your wall socket—which is designed to safeguard the computer and software against damage from sudden fluctuations on the power line.

Clearly, the bigger your computer system, the more attention you should give to insuring it. An increasing number of insurance companies, in addition to those listed on the accompanying chart, are planning to introduce special provisions. So check with your local agent to see what coverage is available. True, taking out insurance is usually considered, but often shoved to a back burner. But when it comes to your home computer, why take chances? FC

COMPARING THE COVERAGE AND COSTS

Below is a sampling of special computer coverage offered by a variety of insurance companies. This chart is designed to highlight some of the features of these policies; when taking out your insurance policy, be sure to read the fine print. Rates may vary depending on where you live and what kind of home you own or apartment you rent.

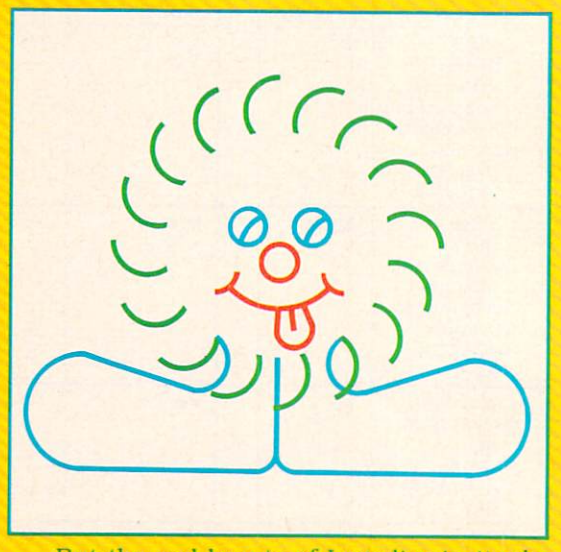
Insurance Company	Computer brands covered	All brands of peripherals and store-bought software covered?	User-developed software covered?	Coverage for home-based business use?	Plan	Type of coverage	Annual premium/ maximum coverage	Deductible per loss
CHUBB GROUP c/o Emett & Chandler P.O. Box 6720 San Francisco, CA 94101	All	Yes	Yes	Hardware—depends on individual case; software contents—no	Comprehensive home owners policy; not available to tenants	All risk*	Rates vary, but are higher than basic homeowners	Varying amount determined by policy
CHUBB GROUP c/o Emett & Chandler P.O. Box 6720 San Francisco, CA 94101	Apple	Yes	No	Yes	Special policy for Apple-computer owners	All risk	$25 for up to $5,000 coverage; maximum $25,000	$100
COVENANT 95 Woodland St. Box 300 Hartford, CT 06101	All	Yes	Yes	No	Endorsement to homeowners policy	All risk	$2 per $100 of coverage; maximum $15,000	No
KEMPER Rte. 22 Long Grove, IL 60049	All	Yes	Yes	Yes	Endorsement to homeowners policy	All risk	$1.50 per $100 of coverage; maximum $15,000	No
NATIONWIDE 2 Nationwide Plaza Columbus, OH 43215	All	Yes	Yes	Yes	Included in standard homeowners policy	All risk	Coverage for up to $3,000 at no extra cost; additional coverage available for up to $10,000	No
SAFEWARE c/o Columbia National General Agency P.O. Box 02211 Columbus, OH 43202	All	Yes	No	Yes	Special policy offered by Columbia National General Agency	All risk	$35 for $2,000 coverage; $15 for each additional $3,000 worth	$50
STATE FARM 1 State Farm Plaza Bloomington, IL 61701	All	Yes	No	Yes	Endorsement to homeowners policy	Named peril,** including power surges	No extra cost for up to $3,000 coverage; additional $5,000 available for $15	$250

NOTE: *All risk: covers *any* peril except those specified, such as wear and tear, gradual deterioration, illegal acts.
**Named peril: covers *only* those perils listed in the policy.

Learning Logo Is a Family Affair

LOGO, THE EDUCATIONAL PROGRAMMING LANGUAGE BASED ON GRAPHICS, WAS DESIGNED FOR YOUNG CHILDREN; BUT IT'S BOTH SIMPLE AND POWERFUL—TRULY A LANGUAGE FOR ALL AGES

BY MINDY PANTIEL AND BECKY PETERSEN



Authors' rendering of Mr. Fuzzy, the creature programmed in Logo by the Weskalnies children.

Meet Mr. Fuzzy. He's a delightful, multicolored creature that appears on the computer screen when Brian or Sherry Weskalnies enters the command DRAW FUZZY. First a wide circle with green hair appears, then big blue eyes and a red nose—followed by a line for a smile, and, finally, gigantic feet.

Twelve-year-old Sherry and 11-year-old Brian, two pint-sized programmers from Longmont, Colorado, wrote the program for Mr. Fuzzy in a programming language called Logo. Though Logo was designed especially for children and is simple to learn and use, it is also powerful and flexible enough to appeal to computer users of all ages. As members of the Weskalnies family found, Logo offers a little something for everyone.

WHAT'S A PROGRAM? WHAT'S A LANGUAGE?

A computer program is a set of step-by-step instructions that tells the computer how to solve a given problem. Computer programs are written with programming languages, each controlled by its own distinct vocabulary and clearly defined rules. [*See "A Novices' Guide to Programming Languages," on page 54.*]

Logo, or turtle geometry as it's often called, has several alluring features. First, it's simple enough to allow very young children to write their own computer programs; second, because the basis for Logo is graphics, the programs provide immediate visual results; third, despite its apparent simplicity, Logo has the capacity to illustrate complex mathematical ideas.

But the real beauty of Logo lies in its design and style. The overall intent of Logo, as stated by Seymour Papert, its chief developer, is to allow children to communicate with computers naturally—more like learning French by living in France, than learning it through textbooks.

PARENTS, CHILDREN, AND LOGO

Sherry and Brian, the creators of Mr. Fuzzy, first learned Logo during a six-week, summer-school workshop. They worked on an Apple IIe computer with *The Terrapin Logo Language* (one of several versions) for 90 minutes each morning. During the last week of classes, they invited the rest of the family to join them on parents' night. The main objective was to teach their parents everything they had learned. By the end of the evening, both their mother, Sharon, and three-and-a-half-year-old brother Chris were beginning to un-

MINDY PANTIEL *and* BECKY PETERSEN, *partners in a communications company, wrote "Take a Lesson from Teachers" for the December issue of* FAMILY COMPUTING.

derstand what Logo was all about.

With coaching from Sherry and Brian, Chris learned enough commands to draw a graphic on the screen. And Mom moved easily into writing procedures for several different geometric shapes.

Jerald, their father, unable to get to parents' night, came to class the next morning to find out what he'd missed. Brian and Sherry demonstrated some of their fancier programs and then taught him some Logo commands and how they could be used in different ways.

Then Jerald joined in. With the Logo users' manual in hand, the threesome was off and running, using Logo in ways that the class had not yet tried. They had great fun, and many other class members gathered around to watch the family in action.

BRINGING IT ALL BACK HOME

The same kind of learning and sharing can go on in the home. Children are naturals with Logo. As with most aspects of computing, children approach programming with a sense of adventure and few inhibitions about touching the keyboard or making mistakes in front of others. Even preschoolers who are just learning the alphabet and number symbols can learn Logo's commands with a little parental coaching or assistance from slightly older siblings.

If elementary school–age children have played with Logo in class, and are using words such as *primitives*, *procedures*, and *sprites*, adults shouldn't be intimidated. Children are really not that far ahead, and—what's even better—they make excellent teachers. With the tables turned, newly trained youngsters are usually very eager to sit down at the computer and share what they know with an eager adult.

By the same token, teenagers might be able to learn something from their younger brothers and sisters. Most teenagers who have studied computer programming in school have probably started with a language such as BASIC, which is built into most computers. An introduction to Logo can be just as captivating for these teenagers as it is for parents.

Working together at writing and perfecting programs can provide quality time as a family. This kind of group project can go a long way toward easing whatever tensions between young and old the computer has caused. And the added bonus is that everyone learns to speak the same language.

MEET THE TURTLE

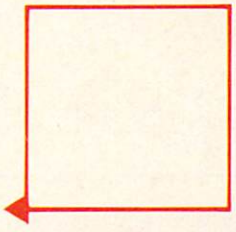
The central figure of Logo is a "turtle," which rests in the center of the computer screen until told to move elsewhere. The turtle is highly mobile and can be directed to take "turtle steps" (approximately one eighth of an inch) with such simple commands as FORWARD (FD), BACKWARD (BK), RIGHT (RT), and LEFT (LT). The turtle leaves tracks—which make a line—as it moves.

Using these commands and others, procedures can be written to draw shapes, which can be saved and called back again. When the original shape is back on the screen, you can add to it and develop an increasingly complex program and graphic.

GET STARTED—WITH A SQUARE

When starting out with Logo, one of the first things a programmer might do is make a square. Young children find it helpful to first "play turtle," by walking through a square themselves, before moving to the computer to teach it the same movements. Older children and adults may want to run through their thinking with a pencil and paper first. Through trial and error, family members will quickly learn that a square consists of a series of forward movements and turns. One procedure for a square might look like this:

```
TO SQUARE
   FD 50
   RT 90
   FD 50
   RT 90
   FD 50
   RT 90
   FD 50
END
```



In the procedure TO SQUARE, the programmer is telling the turtle to move forward 50 turtle steps and make a turn to the right of 90 degrees. This is repeated until all four sides of the square are formed. Once the square has been defined, it can be saved and used in combination with other procedures to make pictures of windows, pinwheels, or houses; or changed in size by adding variable lengths; or enhanced by the addition of background or pen colors.

FOUR SQUARES MAKE A WINDOW

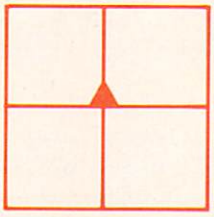
The procedure TO WINDOW combines SQUARE and repeats it four times to make a window.

Shortcuts can be used, too. A command of REPEAT tells the computer to repeat a series of commands written within brackets a specified number of times. The procedure TO WINDOW2 (next page) will execute the exact same graphic as TO WINDOW1.

FAMILY MEMBERS CAN DEVELOP THE SKILLS TO WRITE PROGRAMS FOR GRAPHICS SUCH AS ROCKETS, WINDMILLS, AND FLOWER GARDENS.

The examples of Logo programs shown in this article were written with The Terrapin Logo Language *for the Apple IIe.*

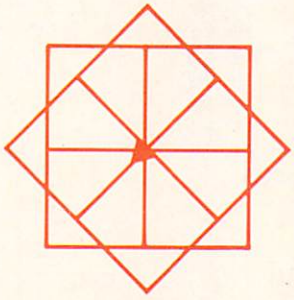
```
TO WINDOW1
   SQUARE
   SQUARE
   SQUARE
   SQUARE
END

TO WINDOW2
   REPEAT 4 [SQUARE]
END
```



ONCE THE SQUARE HAS BEEN DESIGNED, IT CAN BE USED WITH OTHER PROCEDURES TO DRAW MORE COMPLEX SHAPES.

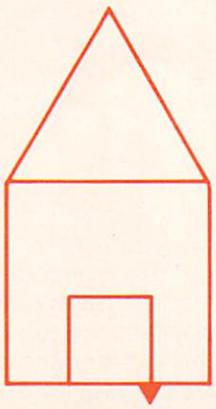
If you take the square and turn it eight times, at a 45-degree angle each time, you will create a pinwheel. You can see that with a very limited number of commands you can develop increasingly complex shapes.

```
TO PINWHEEL
   REPEAT 8[SQUARE RT 45]
END
```



Three separate procedures are used to draw the house below. SQUARE is used for the main structure. TRI, an equilateral triangle, is used to form the roof, and DOOR is used to form the door. Between each subprocedure, the turtle must be directed to the proper screen location to execute the next part of the graphic. For instance, in the TO HOUSE procedure, after the square is drawn, the program tells the turtle to turn right (RT 90) and go forward (FD 50). The turtle is then in position to draw the triangle, or roof.

```
TO TRI
   RT 30
   FD 50
   RT 120
   FD 50
   RT 120
   FD 50
END

TO DOOR
   FD 20
   RT 90
   FD 20
   RT 90
   FD 20
END

TO HOUSE
   SQUARE
   RT 90
   FD 50
   TRI
   LT 90
   FD 50
   LT 90
   FD 15
   LT 90
   DOOR
   SETH 0
END
```



Though the commands in the programs can be immediately checked on the screen, users soon discover that it's hard to write a program that works on the first try. Consequently, programmers must do a lot of work "debugging"—or fixing—the program. While most people show little tolerance for errors at first, they gradually develop a willingness and even eagerness to find the problems and refine their programs. After all, writing a program is really an exercise in problem solving.

Eventually, family members will develop the skills needed to write computer programs for such complex graphics as rockets, windmills, or flower gardens—complete with color and even animation. Thus, though Logo may seem simple, it always presents new challenges. For instance, when writing the program for Mr. Fuzzy, Sherry and Brian Weskalnies had to deal with geometry, algebra, and general problem solving, and use the fundamentals of structured and modular programming.

IS LOGO FOR EVERYONE?

People who have taught both BASIC and Logo have found that users can learn enough about Logo in the first hour or two to program it right away. Such teachers say that beginning Logo programmers are caught up in the excitement generated by the graphics language, and their anxiety about computers seems to vanish. Teachers say they rarely find this reaction to programming from students first learning BASIC.

Nonetheless, family members should examine why they want to learn to program and what they want to use it for. If the motivation is simply to gain an understanding of what computer programming is like or to discover more about the computer education youngsters may be getting at school, then Logo is a good language to consider.

However, if beginning programmers eventually want to move into professional programming, write programs that can solve real-world problems, or modify commercial software to suit their own needs, then a language other than Logo might be more appropriate.

But such people—especially parents with young children—should still consider learning Logo as a family affair. The programming fundamentals that are mastered through Logo can be put to use in learning the new vocabulary and rules of another computer language. Besides, doesn't everyone have some kind of Mr. Fuzzy floating around in their imagination? FC

Different Versions of Logo

THEY ALL HAVE TURTLE GRAPHICS, BUT SOME OFFER A LOT MORE

BY KENNETH P. GOLDBERG

At one time, not so long ago, you needed a Texas Instruments 99/4 computer to use the Logo language. It was first developed for that computer. Shortly thereafter, Logo became available for the Apple II plus. Today, the situation has changed drastically. There are five versions of Logo available for Apple computers, and four for the IBM PC. Logo is also available for Atari, Commodore, and Radio Shack computers; and versions are being developed for Timex and Coleco's ADAM.

If you're thinking of buying a microcomputer, and think that Logo may be a language for you or your children, then it's worth considering the various Logo packages when comparing computers. And, if you already own a computer that has several Logo versions available, you should be aware of the differences, so you can choose one that best suits your needs and pocketbook.

The major feature of most Logo packages is the ability to program and see graphic designs on your screen. All versions of Logo provide the user with a screen "turtle" that can be moved about to draw pictures and create designs in a variety of colors. But the various Logos can vary markedly in other respects.

Let's look at some of the characteristics and capabilities that can make one version of Logo differ from another—both in its operation and its possible application. The features of each version are noted in the accompanying chart.

Format (Disk or Cartridge): Most current versions of Logo come in disk form, and consequently require a disk drive. A disk drive also allows you to save procedures and/or graphics, something most users like to do.

The major advantages of a cartridge version are that you don't need a disk drive to use it (and disk drives can cost upwards of $300) and it is less likely that a cartridge will be damaged.

Backup Copy: Many disk versions of Logo come with a backup copy (if the original disk is protected against copying). If not, instructions in your users' manual will explain how to make a backup copy yourself. If you cannot get a backup copy, think seriously about whether you want to risk the full purchase price, for software is not cheap and can be easily damaged.

Cartridge versions of Logo usually don't come with a backup copy. And, generally speaking, you cannot copy a cartridge.

FILL Primitive: If you draw an outline of a shape, and want to fill it in with a color, the FILL command allows you to do that with a single command. ("Primitive" means that the command is built into the program.) You can accomplish the same effect without the FILL command, but it requires writing a procedure and is significantly more time-consuming.

While the FILL command makes it much easier to draw colorful pictures and designs, many educators have reservations about its use, and some developers have chosen not to include it. These critics contend that the FILL command makes the creative process too easy, and that children don't learn as much about programming as they do writing their own coloring procedures. Nonetheless, the FILL capability is a nice feature.

Sound Generation: Although Logo is best known for its graphics capability, it can be used for many nongraphic applications as well. One of these is music composition. Several versions of Logo have a built-in sound-generation

LOGO CAN BE USED FOR MUSIC COMPOSITION, WRITING POETRY, WORD PROCESSING, LIST PROCESSING, AND DOING MATH HOMEWORK.

KENNETH P. GOLDBERG *is also the author of "A Novices' Guide to Programming Languages" in this issue.*

LOGO VERSIONS WITH SPRITES ALLOW YOU TO ANIMATE YOUR PICTURES.

system—which allows the user to modify the pitch, frequency, and duration of sound. With this feature, you can create and play musical compositions. Sound generation can also be used with text and graphics to create exciting games and activities.

Arithmetic: If you want to make learning and using Logo a "family affair," you might want a version that your children can use to do their math homework, and that you can use for simple home and business math applications. Many versions of Logo offer this capability. For instance, to add 15 and 32, all you have to do is type PRINT 15 + 32 and press the RETURN (or ENTER) key, and the answer (47) appears on the screen.

Math Functions: Most Logo versions also include more sophisticated math functions and allow the user to work with trigonometry and logarithms. If you want your children to learn a language that can be used for more than drawing pictures, and possibly as a stepping stone toward learning a more advanced programming language, then you should consider these advanced math functions when comparing programs.

List Processing: List-processing capability means a program can generate and manipulate data and text, such as numbers, letters, words, and sentences. List processing can be used to write poetry or word-and-sentence games; and, it can double as a simple word-processing program to help improve writing and editing skills. List processing can also be combined with Logo's graphics and mathematics capabilities to develop sophisticated games and educational programs.

Sprites: Sprites are screen objects that can be given shape and color and set in motion to animate a picture. They come either as predefined shapes or with a shape-editing procedure that can be used to define new shapes of your own choosing. For example, if CLOUD is a predefined shape, then the command SETSHAPE CLOUD will put a cloud on your screen. In versions that allow you to design your own shapes, you could define a rocketship, and then use the command SETSHAPE ROCKETSHIP to set it in motion from the bottom to the top of the screen, as if it were blasting off. The main thing to know about sprites is how many are available. The more, the better.

As with the FILL command, some educators argue that sprites make it too easy to create a

A QUICK COMPARISON

Name	Developer	Machine requirements	Price	Format	Backup copy?	FILL primitive?
Apple Logo	Logo Computer Systems Inc. (514) 631-7081	Apple II/II plus/IIe with 64K	$175	Disk	Included	No
Sprite Logo		Apple II/II plus/IIe	$299	Disk	Permission to copy given	Yes
Atari Logo		All Atari home computer models	$100	Cartridge	No	No
IBM Logo		IBM PC/IBM PC*jr*	$175	Disk	Permission to copy given	Yes
Color Logo	Micropi Inc. available through Radio Shack (817) 390-3944	32K TRS-80 Color Computer with disk drive (disk); 16K TRS-80 Color Computer (cartridge)	Disk $99 ROM pak $49.95	Disk or ROM pak	Permission to copy given	No
Commodore Logo	Terrapin Inc. (617) 492-8816	Commodore 64	$59.95	Disk	Must send $5 to Commodore	No
DR Logo	Digital Research Inc. (617) 751-5139	IBM PC (with CP/M 86)	$99.95	Disk	Included	No
Krell Logo (without sprites)	MIT Logo Group (617) 253-7357	Apple II/II plus/IIe; Franklin Ace 1000	$89.95	Disk	Included	No
Krell Logo (with sprites)		Apple II/II plus/IIe	$400	Disk	Included	No
PC Logo	Gold Hill Computer and Harvard Assoc. (617) 492-0660	IBM PC; Eagle PC; Compaq	$199.95	Disk	Included	No
Terrapin Logo	MIT Logo Group (617) 253-7357	Apple II/II plus/IIe with 64K; Franklin Ace	$149.95	Disk	Not included; copy protected	No
TI Logo II	MIT Logo Group and Texas Instr. (617) 253-7357	T1-99/4A with 48K	$99.95	Plug-in module	No	No

colorful, active screen display, and that children won't explore and develop new ideas and programs. But Seymour Papert, the inventor of Logo, thinks that there should be no rules governing the use of the language, and that the different versions will naturally appeal to different types of people.

Setspeed Primitive: The SETSPEED command will set a sprite in motion at a certain speed. This is desirable because you may want different sprite objects to move at different speeds in the same picture. For example, the rocketship blasting off into the clouds would certainly be expected to move faster than the cloud, which should be slowly drifting across the sky. Finally, a SETHEADING command (not included in the chart), which some versions include, will allow you to tell a sprite to move in a certain direction.

Print Out Text and Graphics: There are times—either for record keeping or in order to share your programming exploits with friends—that you may want to print out copies of your work on paper. You may want copies of procedures or programs, data or text material, or graphics. In order to do this, Logo must have the capability built into it. Of course, to print out screen graphics on paper you also need a printer with graphics and/or color printing capability, and not all printers have this. But the first requirement is that the language itself have the ability to print out graphics.

Save and Read Graphics from Disk: All versions of Logo allow you to save text, procedures, and programs on a disk, so that you can read them back into the computer whenever you want to see or use them again. Some versions, however, also allow you to save *graphics* that you have drawn, and then "read" them back into the computer's memory and onto the screen, colors and all. This is not a necessary feature, but it does allow you to call back graphics onto the screen very quickly. You could do it otherwise by recalling the program itself and then running it, which would take a little more time.

If you want to use Logo to develop activities that mix text and graphics smoothly and without delay (such as stories in which pictures appear on the screen at appropriate times to break the monotony of pure text), or if you want to avoid undue delay in getting your drawing back on the screen from a disk, this is a feature well worth having.

YOU CANNOT PRINT OUT SCREEN GRAPHICS ONTO PAPER UNLESS LOGO HAS THAT CAPABILITY BUILT IN.

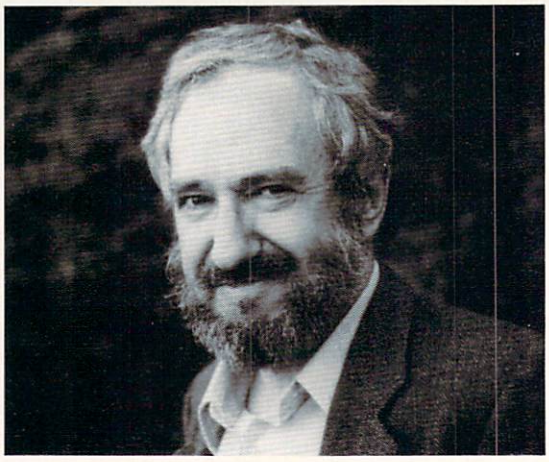
OF VERSIONS OF LOGO

Sound?	Arithmetic?	Math functions?	List processing?	Sprites? (how many?)	SETSPEED primitive?	Print out text and graphics?	Save and read text and graphics on disk?
No	Yes	Yes	Yes	No	No	Text only (graphics w/tool kit)	Text only
No	Yes	Yes	Yes	30	Yes	Both	Both
Yes	Yes	Yes	Yes	4	Yes	Text only (program for graphics planned)	Text only
Yes	Yes	Yes	Yes	No	No	Both	Both
No	Yes	No	No	256	Yes, called slow	Text only	Both
Yes	Yes	Yes	Yes	8	Yes	Both	Both
Yes	Yes	Yes	Yes	No	No	Both	Text only
Yes	Yes	Yes	Yes	No	No	Both	Both
Yes	Yes	Yes	Yes	32	No	Both	Both
Yes	Yes	Yes	Yes	No	No	Text; graphics w/ DOS 2.0	Both
Yes	Yes	Yes	Yes	No	No	Both	Both
Yes	Yes	No	Yes	32	No	Text only	Text only

The Man Behind Logo

BY NICK SULLIVAN

SEYMOUR PAPERT, THE INVENTOR OF LOGO, HAS A LOT OF POWERFUL IDEAS.



"I THINK IT'S BETTER TO PUT 100 COMPUTERS IN ONE PERCENT OF THE SCHOOLS THAN ONE COMPUTER IN 100 PERCENT OF THE SCHOOLS."

Seymour Papert, professor of mathematics and education at the Massachusetts Institute of Technology (MIT), and self-confessed "hacker," is recognized as the founding father of Logo. [See "Making Logo a Family Affair," on page 64]. *He designed the new programming language with the idea that it should be at once powerful and accessible to children and other new computer users. He then formed the MIT Logo Group to develop it. The Logo Group has worked for more than a decade with hundreds of children to develop and refine Logo at MIT's Laboratory for Computer Science. Papert has also worked with Logo Computer Systems Inc. (Quebec, Canada) to produce commercial versions of Logo.*

In recent years, the South African–born Papert has assumed a larger role in the computer world. He has worked with the World Center for Computation and the Human Resources in Paris, which is attempting to cultivate a widespread "computer culture" especially in Third World societies and among unemployed French workers. He is the author of Mindstorms, *a book about "children, computers, and powerful ideas." And he lectures frequently to professional groups, urging them to build and disperse a computer-learning culture in the United States.*

Papert thinks that computers can be flexible tools that put the power of learning and sense of discovery into everyone's hands.

When asked a question, Papert's head shrinks back into his shoulders, his forehead furrows, his eyes close to within a millimeter of shut. In this motionless, pensive pose, he looks like a Rodin sculpture. He looks like a thinker.

While he's thinking, he may muse aloud, "Well, yes, what can you say about that?" That gets his engines going, and he starts thinking aloud—old thoughts, current thoughts, totally original thoughts. Then he stops himself with, "I'm just rambling."

Hidden amongst the ramblings are kernels of wisdom that lead to more questions—more than were asked and probably more than can be answered.

FC: You've said that computers are like pencils, in that they're something every child should have. Why do you think that?

Papert: Computers are more than pencils; they're scratchpads. The pencil is not used only for writing but for biting, doodling, writing illicit notes, and scribbling. Furthermore, pencils are not a toy—they're an adult thing. A child who takes a pencil is appropriating an adult thing, which gives him or her a sense of power.

And in schools, if you want to teach children to write, you give them each a pencil. You don't say, "Here's a pencil, pass it around when you're finished." The same should be true of computers. I think it's better to put 100 computers in one percent of the schools, than one computer in 100 percent of the schools.

FC: Most schools aren't going to buy one computer for each student. What do you consider an acceptable ratio?

Papert: I think that one computer per seven students is a good ratio. But there's only one good answer to the question, and that is: "A computer for every child by 1986," which is the slogan of a new campaign I'm launching.

FC: Obviously, wealthy schools have more computers than poor schools. But do you see much difference in the way computers are used in these schools?

Papert: In wealthy schools, kids use computers in more creative ways. In poorer schools, computers are used largely for drill-and-practice. I don't want to take away from schools that have to do this kind of remedial teaching, but they should be doing other things as well. In other words, physical access to computers doesn't necessarily mean cultural access.

FC: Is programming being taught or learned in different ways?

Papert: There's a "hard" mastery and a "soft"

PHOTOGRAPHS BY WYNTER SNOW

NICK SULLIVAN, *the features editor of* FAMILY COMPUTING, *wrote "Portrait of an Artist as a Software Rebel" for the January issue.*

mastery. A lot of the best progamming is soft, or unstructured, but theorists have grabbed onto the hard, planned, structured approach as the best one.

There are two types of programmers. Some love the detail and the security of their "microworld." Others feel threatened by the limits of programming languages. I've learned this because there are two types of Logo. One uses very precise line drawings; the other is more dynamic and is almost good enough to design a *Pac-Man*–type game. And each type appeals to a different type of person.

FC: How would you describe these people?

Papert: There are "obsessional" and "hysterical" people, what some call left-brained and right-brained people. These two types of people, and the two types of Logo, raise another equity issue. You don't want to produce software that will appeal to only one personality. And almost all schools are biased toward the obsessional, or structured, character, just as they were once biased toward right-handers. We know now that making people organize their thoughts in an unnatural fashion—such as turning left-handers into right-handers—can cause great harm to their learning. The same syndrome is occurring today with computers. Maybe that's why the best programmers don't learn their tricks in school.

FC: A lot of people worry that computers isolate kids from one another and from society at large. They refer to the recent spate of computer break-ins as a case in point. What do you think?

Papert: Left alone, without intervention, there's a pretty large scale of isolationism among computer users. But the popular views comparing hackers to drug addicts are extremely oversimplified. There may be a few hackers who are criminal, just as there are painters or merchants who are criminal. But children and computers . . . it's just a social response to growing up. And the majority of children respond to computers in a social way.

FC: If parents are worried that computers are isolating their children, what can they do about it?

Papert: I don't think there's much they can do. The FBI seizing computers from kids who break into computer systems, as they did last fall, is about as effective as shutting down stills during Prohibition. The only way to stop computer abuse—which is what some see as the result of computer isolation—is to turn the U.S. into a high-security prison.

What I think we'll see is a "privitization" of education. As parents learn that they can do more with computers than the schools are doing, there'll be a tendency to set up alternative social settings, such as block learning groups. They might meet three times a week, or whatever, as computer users' groups do.

FC: Do you see much difference in the way boys and girls respond to computers?

Papert: I don't want to make too many sweeping generalizations. Let's just say that girls adapt to Logo more easily than they do to BASIC; and the difference between girls and boys is much smaller with Logo.

FC: Do you think your voice, or anyone else's, is being heard—are computers taking hold among the underprivileged?

Papert: There's nothing systematic so far. There's a lot of grass-roots activity with drop-in centers and the like. What's most exciting about the computer movement is the number of people doing new things—writing software, starting magazines, writing letters. It's unprecedented, effervescent learning. But, to make this learning widespread, we need the help of computer professionals. I think that in time we may see some of the unrest typical of the 1960s, with people symbolically banging down the doors of decision makers to protest against discrimination in society.

FC: Where do you stand on the issue of piracy—or illegally copying software and distributing it to others?

Papert: I'm schizophrenic. I believe, in principle, that software should be distributed as a free resource; on the other hand, it costs money to develop software. I have a huge conflict with Logo. I'd like to give it away. But unless a gold mine is found, we'd have no money to support new development.

FC: Did you ever think, 15 years ago, that Logo would be so successful?

Papert: No, the whole thing took me by surprise. The most surprising part has been the way it's taking hold. I had thought Logo would succeed, but very slowly, by trickling down from academics and theorists to the schools. But it's been turned upside down. The teachers and students have been pushing for it.

FC: In *Mindstorms*, you say that your fascination with gears as a child, and your eventual understanding of how they worked, gave you a model to grasp new and abstract ideas. Do you think Logo has succeeded in giving other children a flexible model of their own?

Papert: Yes, I think so, for quite a few children. It's quite pleasing to see children five years later who have integrated their Logo experiences into their thought patterns. That's very gratifying to me. FC

Dr. Seymour Papert introducing a youngster to the fun of Logo.

"I HAVE A HUGE CONFLICT WITH LOGO. I'D LIKE TO GIVE IT AWAY. BUT UNLESS A GOLD MINE IS FOUND, WE'D HAVE NO MONEY TO SUPPORT NEW DEVELOPMENT."

A HANDS-ON REVIEW:

Timex 2068

THIS NEW COLOR COMPUTER IS EASY TO USE, AND POWERFUL, TOO

BY SHARON AKER

TIMEX 2068 FACTS

MEMORY: 48K RAM, nonexpandable
USER-AVAILABLE MEMORY IN BASIC MODE: 38.5K
KEYBOARD: 41 flat, rubber, multifunction keys
VIDEO OUTPUT: TV or monitor
TEXT DISPLAY: 32 × 24 lines standard, 64 × 24 lines alternate mode; upper- and lower-case letters
GRAPHICS: 8 colors (2 hues each); 256 × 192 normal resolution, 512 × 192 alternate mode
SOUNDS: 3 voices, 10 octaves, 1 "beep" channel; built-in speaker
SUGGESTED RETAIL PRICE: $199

The new Timex Sinclair 2068 Color Computer weighs in at less than three-and-a-half pounds, but it's no lightweight when it comes to computer power. It compares favorably with other computers in its price range, and some of its features are generally found in only much higher-priced models. It's a suitable computer for the novice, and one that will grow to meet his or her changing needs.

MEMORY CAPACITY

The Timex 2068 is advertised as having 72K of memory, which is a little misleading. Actually, it has 48K RAM and 24K ROM. A sizable 38K RAM is available to the user when operating in the BASIC mode. This is just a little less than is available from the Commodore 64, with its 64K RAM. While the 2068's RAM memory cannot be expanded, plug-in ROM cartridges contain up to 56K; when you use them, the regular 48K RAM is left open for the user. These cartridges, in effect, give instant expansion.

This is made possible because the 2068 has what is called "bank switching" capability—which means that the computer can address more than one "memory bank" at a time. Such bank switching is unprecedented in a $200 computer.

STORAGE

The 2068 has a neat flip-up cartridge slot to run programs on cartridges, though you cannot store data on them. You can also load and save programs on any cassette recorder. (Timex sells its own cassette recorder for $50.) The TS 2068 appears to work well with a variety of recorders, unlike its somewhat finicky forerunner, the TS 1000. And it makes saving programs relatively easy, with a VERIFY option not found on many computers.

Sometime this year, Timex is expected to introduce a "micro drive," which will load programs much faster than a cassette recorder, but slower than a disk drive. The micro drive (expansion box, controller card, and micro drive will cost about $250) will attach to the back of the 2068, and accept programs stored on small, square "capsules," a new software format. You can store your own programs on blank capsules.

KEYBOARD

While the 2068 does not have a typewriter-style keyboard, its flat, rubber keys are very comfortable to work with. In fact, the only thing that may make touch-typing a little awkward is that the punctuation symbols are not located in their usual spots, and are accessed with a special SYMBOL SHIFT key instead of the regular SHIFT key. However, the "F" and "J" keys each have a little bump to assist touch-typists in finger placement.

While the keyboard is not ideal for word processing (Timex says it will soon release a word-processing program), it is superbly designed for typing in programs. Perhaps the most noteworthy feature of the 2068—as it is of all Timex Sinclair computers—is its "one key" command entry. For example, instead of typing PRINT, you press the "P" key and PRINT appears on the screen.

Because each key can have up to six functions—one of three commands, upper- and lower-case letters, and a mathematical or punctuation symbol—there are two types of SHIFT keys. To implement certain key functions, one or both of these keys sometimes must be pressed. While this isn't exactly one-key command entry, it's an easier system to work with than the standard one. It's especially convenient for children.

Finally, there is enough room between each of the keys to allow for the addition of keyboard overlays with special designations. Timex will release these with certain software packages, particularly its upcoming version of Logo.

BASIC

Built into the 2068 (in its sizable 24K ROM) is an "extended," more powerful version of the original Sinclair BASIC. It has a feature convenient for everyone, but indispensable to the beginner: a syntax checker (as in the TS 1000). Every time you write a line of program code, this editor checks to make sure the grammar of the command is correct. If you have used a semicolon instead of a colon,

SHARON AKER, *who lives in Sussex, New Jersey, with one husband, two children, and three computers, has published over 50 articles in computer magazines. Many of these have been reviews of new hardware.*

PHOTOGRAPHS BY LANGDON CLAY

or left out the closing quotation marks, the computer will indicate a problem immediately. Most computers accept incorrect program lines and let you run part of the program, stopping only when the problem line is encountered.

You can give in to your artistic urges with commands such as DRAW and CIRCLE. You can also create your own characters—letters of the Greek alphabet, or just a "happy face" symbol. While "user-defined graphics" are available on some other computers, I have never seen an easier method of design and use than on the 2068.

COLOR

There are eight basic colors on the 2068, with a command that changes their brightness; the change is so noticeable that, in effect, you have 16 colors to work with. The color of the characters on the screen, and the background and border colors can all be controlled separately with one-key commands.

Though the 2068 can be connected to a TV or regular color monitor, it can also output signals to an RGB (Red-Green-Blue) monitor. RGB monitors are expensive (approximately $600) and require an expansion box on the Timex ($100), but provide brighter color displays.

SOUND

The sound has quite a range, although the small built-in speaker on the bottom of the keyboard unit somewhat limits its quality. Each of the three sound channels can be programmed separately for tone or volume. You can also program sounds such as a siren, an explosion, or a dragon's roar, much as you can on an Atari. The sound programming is probably the most involved aspect of Sinclair BASIC, although it isn't extremely difficult.

RESOLUTION

The 2068's normal resolution is 256 × 192—that's the number of pixels, or dots, on the screen. This is about average for computers in the 2068's price range. However, a second display mode has 512 × 192 resolution, which is very high. In this mode, the screen can display 64 characters across the screen, instead of the 32 available in normal mode, which is much better for displaying text on the screen. However, this high-resolution mode requires twice as much memory as the lower mode, and will thus limit the type of software that can be used.

PERIPHERALS

To connect peripherals other than a TV, monitor, joystick, or cassette recorder to the 2068, you need to purchase an expansion box ($100), which fits into a slot in the back of the unit. In the past, most peripherals for Timex have been made by third-party manufacturers, but now Timex is supporting its newest computer with several products.

Timex's 2040 thermal printer ($99) uses 4½-inch heat-sensitive paper; its best use is to get a "hard copy" of your program listings. Timex has said it plans to come out with an 80-column printer, which can be used for printing out letters or manuscripts. The printer, like the TS 2050 modem ($120) currently available, will connect to the expansion box. In addition, any Centronics-compatible parallel printer can also be connected to the expansion box.

One of the best Timex "peripherals" is its customer support. Its customer hotline (800-24TIMEX), which I have used for questions, trivial and technical, dozens of times during the past year, has always responded with the needed information. And now, you can order a new computer direct from the company by calling this same hotline—a service to those who live in rural areas not served by major retailers.

SOFTWARE

Timex is preparing 40 cassette and cartridge programs to market for the 2068. They fall into the home business (*Vu-Calc*, *Vu-File*, *Vu-3D*, etc.), game, and educational categories. The game programs made available for review (*Horace Goes Skiing*, *Crazy Bugs*) were impressive, with interesting play and excellent graphics. The educational programs I looked at were well written, though not exceptional. Most of the programs are now available in cassette form, and will come out later in cartridge. Whether or not outside software companies will produce TS 2068 versions of popular programs depends on two things: how well the computer sells and how hard a bargain Timex drives. The company has said it wants to charge others for the right to develop 2068 software in its proprietary "capsule" format.

A POWERFUL, EASY-TO-USE COMPUTER

The choice between the Timex 2068 and other computers in its general price range—Atari 600XL and Commodore 64—comes down to personal preference and intended application. For game playing, the Atari is tough to beat. The same can be said of Commodore 64 when it comes to music composition. Both also have more standard keyboards and a much wider software base.

Children seem much less intimidated by the Timex keyboard, however, which makes it a good family computer. And, its one-key command entries make it a good computer for any programming novice. When it comes to ease of use, the 2068 stands near the head of the class. And it has enough power and features to continually challenge and grow with its users' needs.

TIMEX 1500 FACTS

MEMORY: 16K, expandable to 32K
USER-AVAILABLE MEMORY IN BASIC MODE: 14K
KEYBOARD: 40 flat,"soft-touch" rubber keys
VIDEO OUTPUT: TV
TEXT DISPLAY: 32 char × 24 lines; uppercase only
GRAPHICS: Black and white; 64h × 44v
SOUND: None
SUGGESTED RETAIL PRICE: $79

The new Timex Sinclair 1500 is an improved, upgraded version of the popular TS 1000, which it replaces. The three main improvements are the keyboard (calculator-style rubber Chiclet keys), the memory (16K standard), and added ventilation to cut down on overheating problems. Like its forerunner, the 1500 is designed as a "startup" computer. With its attractive programming features—one-touch key-word commands, a built-in syntax checker that spots errors when you make them, and low price ($79)—Timex expects the 1500 will be quite popular in schools.

The TS 1500 is compatible with the large library of cassette programs and all the peripherals available for the TS 1000. In addition, Timex plans to sell a cartridge interface that will plug directly into the computer—allowing the use of cartridge programs. The Timex 2050 modem can also be connected to the 1500. Initially, the 1500 will not be as widely available as the new TS 2068. FC

A Data-Base Reunion

PLANNING A HIGH SCHOOL REUNION IS NO EASY FEAT. NEITHER IS KEEPING TRACK OF BAND BOOSTERS AND GIRL SCOUT COOKIE SALES. YOUR COMPUTER CAN MAKE IT ALL POSSIBLE.

BY ROBIN RASKIN

Karen Monrad was the model of a "successful" student at Amphitheater High School in Tucson, Arizona. She was a student council member, a baton twirler, and president of the teen club. So, it was no surprise that she was instrumental in assembling her former classmates—the 1963 graduating class—for their 20-year reunion.

The surprise, perhaps, was that such a grand gala could be planned and implemented without the tedious hours of paperwork usually required when planning a reunion. Reunion planners traditionally spend long and sleepless nights piecing together the class lists amidst a sea of scribbled three-by-five cards. Sore fingers and aching backs—from hours spent typing out mailing labels—are often as much a part of the planners' memories as the event itself.

For Karen (Monrad) Groseclose, however, who volunteered her services, her Apple computer, and her data-base management software, the task at hand was no surprise. The 38-year-old mother of three is an old hand at organizing data. Karen, who moved north from Tucson to Phoenix, began her career as a computer programmer and worked her way through the data-processing ranks. She is currently a data-processing consultant responsible for the testing of large computer systems.

In addition, Karen has brought her professional skills home without strain. Her interest in computers has rubbed off on other family members. Her children—Ben, 13, John, 12, and Susan, 11—have used their Apple II and now their Apple IIe for more than four years to keep track of their community endeavors. While her husband, David, an attorney, is not

an active computerist, he is an enthusiastic bystander. Data-base management has been a key factor in Karen's growth into the realm of public service.

DEFINING DATA BASE

Data-base management provides a general, flexible system for keeping track of information; it's a kind of souped up record-keeping system—a way of organizing information about a particular subject. We refer to the information as data; data is simply a description of an item. The information can be a person's name, weight, or an insurance-policy number.

The data base is organized to let you catalog information. The computer, therefore, can do time-consuming clerical work (like compiling address lists and typing mailing labels).

The first step in creating a data base is accumulating the information you want to store and formatting it. This collection of information is called a record. The individual parts of a record are called fields. Using a data-base format, you must specify your file name and your record fields.

Basic fields can be: LAST NAME, FIRST NAME, ADDRESS, and ZIP CODE. Additional fields depend on your specific needs. Data-base programs ask you to specify the length (how many characters) for each field and what type of information (alphanumeric, numeric, a date, or arithmetic formula) the field contains. It is often a good practice to create a lot of small fields of information (STREET, STATE, and ZIP CODE) as opposed to one big field (TOTAL ADDRESS). That way you can easily sort different categories. For example, if you're doing a large mailing you can get less expensive postage rates if you have the letters sorted by zip code.

Remember, however, that an overabundance of fields will create additional typing, require more computer memory, and deplete room for other records. (The data base will calculate the maximum number of records your memory can hold.)

To avoid the need to reformat later, it is often helpful to leave a blank numeric field and a blank alphanumeric field.

Once all the fields have been created, the initial typing hurdle needs to be tackled. This task can take any number of hours or days depending on the amount of information collected.

Information in data bases can be easily modified and updated. Each time you acquire a new piece of data, you can add, modify, or delete a record. Updating the data base regularly is a necessary and important part of the information-management process.

More than just a computerized filing cabinet, some data-base programs can also serve as question-and-answer machines. They can be organized to retrieve information based on certain established questions (criteria). Some examples of its capabilities are: counting, searching (often the data base's main pastime), sorting (listings by criteria), joining (existing data bases), merging (with a word processor to print out personalized letters), and computing formulas (subtracting, averaging, totalling).

The lists you can generate with a data base are limited only by your imagination. The data-base system lets you organize and display information in a way that's meaningful to you and customized to suit your needs.

A "PERFECT" PACKAGE

For the reunion, Karen used the data-base management software package called *Data Perfect* to handle all her needs. The software works hand-in-hand with her word-processing package, *Letter Perfect*, and the software for both is exceptionally "user-friendly."

Computerizing the class of '63 began in

REUNION PLANNERS TRADITIONALLY SPEND LONG AND SLEEPLESS NIGHTS PIECING TOGETHER THE CLASS LISTS AMIDST A SEA OF SCRIBBLED THREE-BY-FIVE CARDS.

SPEAKING IN DATA BASE

Here's a list of vocabulary words to get you started with your data base.

TERMINOLOGY

DATA BASE: An organized collection of information. It is structured so information can be referenced, retrieved, and updated easily.

RECORD: A record is a collection of data and information about a subject, such as a member of the band, a girl scout, or a former classmate. A collection of records is called a data base.

FIELD: The individual components of records that store a particular type of data. Fields may be numeric, alphanumeric, formula fields (the sum or average of other fields), or dates (MM/DD/YY). Name, age, and social security number are just a few examples of fields you may use.

DBMS (DATA-BASE MANAGEMENT SYSTEM): A generic name for the application software designed to organize data so it can be easily retrieved, referenced, and updated.

DATA-BASE OPERATIONS

CREATE: The criteria for your particular data base.

UPDATE: To add, modify, or delete information in an already-existing data base.

SEARCH: Finding a record or records in a file by specifying the values or range of values for particular fields.

SORT: Arranging the data-base records in order along a given criterion (i.e., alphabetical sort for last names, or numerical sort from most expensive to least expensive).

MODIFY: To alter the contents of a record.

REPORT GENERATION: The printing of the material in the data base according to a specified format.

ROBIN RASKIN *works as a technical writer for a computer consulting firm in New York and is currently coauthoring a book on computer applications. Her last article for* FAMILY COMPUTING, *"Let's Be Friends," appeared in the January issue.*

September, 10 full months before the scheduled July 4th reunion. The planning committee gladly relinquished its three-by-five cards which contained—to the best of their knowledge—the names, addresses, and phone numbers of all 300 class members. The committee could use the time saved in clerical duties to work on other parts of the reunion celebration.

The index cards provided a good jumping-off point for Karen.

For the reunion, the specified fields included LAST NAME, FIRST NAME, MARRIED NAME, SPOUSE, ADDRESS, CITY, STATE, ZIP CODE, NAMES AND NUMBER OF CHILDREN, DEGREE, OCCUPATION, THE MOST FAMOUS PERSON THEY'D EVER MET, THE HIGHLIGHT OF THEIR LAST 20 YEARS, and THEIR GOAL FOR THE NEXT 20 YEARS. Karen left a field to indicate if the alumnus had been located or not, and she left two blank fields in order to expand the categorization over the years—in anticipation of the '93 reunion.

THE GROSECLOSES' "BACK ROOM" DATA SHOP IS THE UNOFFICIAL RECORD-KEEPING HEADQUARTERS FOR THE LOCAL GIRL SCOUTS, THE MADISON #1 SCHOOL BAND, AND ANNE LYNCH, CANDIDATE FOR PHOENIX CITY COUNCIL.

In addition to standard data, Karen needed to incorporate tricky information such as how uch room do you leave in your data base for answers to questions like "What's the most memorable thing that's happened to you in the last 20 years?" Some responses were one-word; some were a veritable book.

To make typing simpler, Karen used the default value often. Default lets the computer supply specified information; you don't have to enter every field by typing in the answer. For example, most of the alumni still live in Arizona, so she set the default for the STATE field to read ARIZONA. That told the computer to input Arizona automatically as the state unless otherwise specified.

With the encouragement of David and Karen, the Groseclose children typed in all the initial reunion information in a few days of intensive work.

RECORDING A MEMORY

Once all the data was entered, a printed report of the contents was created. But before any report leaves the Groseclose household, it is carefully checked against the three-by-five index cards or lists. "Enter a problem, and you'll get a problem," warns Karen. "Often, people will enter incorrect data, make a typo, never check their original work, and then wonder how everything got so fouled up."

After its accuracy was verified, the reunion report was sent to the Tucson committee. The Groseclose's Epson MX-80 FT printer was used to produce mailing labels for sending announcements and update forms.

UPDATING DATA

Responses for the reunion trickled in. Each time a "sufficient pile" accumulated, Karen would call up her information or enter new data. During this updating phase, the missing persons' hunt launched into full swing. The updated data base was printed out, and a missing persons' list was compiled and mailed to those who responded to the initial questionnaire. The respondents were asked to send in information on the whereabouts of missing classmates and to correct inaccuracies.

After the reunion, the final task was to produce a "Memory Book," which incorporated some of the data base's information about each alumnus.

COMMUNITY CONTRIBUTIONS

The high school reunion is not the only data-base accomplishment Karen and her family of young experts can claim. The Grosecloses' "back room" data shop is the unofficial record-keeping headquarters for the local Girl Scouts, the Madison #1 School Band, and Anne Lynch, candidate for Phoenix City Council. The computer room often serves as a haven for neighborhood children as well.

"Whether I create a data base for the band, the scouts, or the reunion, it's all basically the same kind of information," says Karen.

Many data-base activities, like Karen's, require a long-term commitment. "I traced the band over the years from Ben through Susan," says Karen.

"This year, I just had to delete the kids who graduated, add the kids who started, and change the addresses of the ones who moved. For the first mailing of the year, all I had to do was enter those updates, produce the labels, and voilà, the band could then invite all the parents to the first Band Boosters meeting. When you have 250 kids in the band and three or four mailings a year, that's a lot of envelopes to write out manually. It took a load off the band director; he had a chance to brush up on his tunes instead.

"The data base is my friendly mathematician, too. For the city council, I needed to know who in the data base contributed more than $25. I told the computer to search on the CON-

#	NAME:	LEN	#	NAME:	LEN	#	NAME:	LEN	#	NAME:	LEN
0	KEY:	5	1	TROOP	4	2	SCOUTS	3	3	SCOUT	24
4	PHONE	8	5	ADDRESS	24	6	CITYST	8	7	ZIP	5
8	COOKIE CHR	24	9	PHONE	8	10	ADDRESS	24	11	CITYST	8
12	ZIP	8	13	KOOKABURRAS	5	14	HOEDOWNS	5	15	DUTCHNSUCH	5
16	CHOC. VAN	5	17	SCOTTEAS	5	18	MINTS	5	19	SAVANNAHS	5
20	TOTAL	7	21	TO COLLECT	10	22	TROOP TOTAL	10	23	EXTRA1	24
24	EXTRA2	24	25	EXTRA3	24	26	EXTRA4	24	27	PROFIT	10

FIELDS: 28
RECORD LENGTH: 349
MAX # OF REC: 352
OF REC: 36
ACTIVE REC: 36
CREATED: 03/07/83
UPDATED: 10/22/83
FORMULA: 4

FORMULA:

```
20 F(13)+F(14)+F(15)+
F(16)+F(17)+F(18)+
F(19)
21 F(20)*1.75
22 F(20)*2.00
27 F(22)-F(21)
```

Fields can be created based on your specific needs. For the Girl Scout cookie sale, Karen created fields to reflect basic information as well as computations. Field 22 is the total money collected from the cookie sale. Fields 23–26 are blank fields that may be used later for additional information. Field 27 is the total money from cookies sold (field 22) minus the total money girls owe for cookies (field 21) = PROFIT.

"THE DATA BASE TAKES A WHILE TO SET UP, AND THEN YOU JUST HAVE TO UPDATE IT. ALL IT TAKES IS TIME—TIME AND TYPING."

Computerizing the Amphitheater High School class of '63 began 10 months before the scheduled July 4th reunion. Even the Groseclose children participated in typing reunion information into the data base.

A SAMPLING OF DATA-BASE SYSTEMS

Choosing a data-base management system requires careful thought and research. Although the initial time investment may seem excessive, it's better than finding you've wasted your cash investment later. Your first step before purchasing a data-base program is to determine its potential applications for you. Ask yourself some basic questions: Will children be using it? How often will you be using it? Review the program's features: Can it search, sort, or formulate? Visit local retailers and have them demonstrate their software with your applications in mind. Remember: It is more effective to choose a system based on your current needs than to buy one and try to adapt it. We have provided a brief list of software available for use on different machines. [*An in-depth feature about data-base- management programs and how to shop for them will appear in an upcoming issue.*]

PROGRAM	COMPANY	MACHINES	PRICE
dBaseII	ASHTON-TATE, 10150 W. Jefferson Blvd., Culver City, CA 90230, (213) 204-5570	Apple II/II plus/IIe/III w/CPM, IBM PC, TRS-80 Model II,	$700
Data Base Management	ALPHA SOFTWARE CORP., 30 B St., Burlington, MA 01803, (617) 229-2924	IBM PC	$250
Data Factory	MICRO LAB, 2699 Skokie Valley Rd., Highland Park, IL 60035, (312) 433-7550	Apple II/II plus/IIe IBM PC	$180 $250
Data Perfect	LJK ENTERPRISES, 7852 Big Bend Blvd., St. Louis, MO 63119, (314) 962-1855	Apple II/II plus/IIe Atari 400/800/1200	$129 $99
Database Manager	MICRO ARCHITECT, INC., 6 Great Pine Ave., Burlington, MA 01803, (617) 273-5658	IBM PC TRS-80 Model I/II/16	$195
Database Manager	SIMPLIFIED SOFTWARE SYS., 118 Third Ave., NW, P.O. Box 1192, Hickory, NC 28601, (704) 328-2386	TRS-80 Models I/III	$69
Easy Filer	IUS, 2401 Marinship Way, Sausalito, CA 94965, (415) 331-6700	TI-99/4A IBM PC	$400
File Clerk	SOFTWARE LABS, INC., 6924 Riverside Dr., Dublin, OH 43017, (614) 889-5083	IBM PC	$50
Flexfile	AB COMPUTERS, 252 Bethlehem Pike, Colmar, PA 18915, (215) 822-7727	Commodore 64/VIC-20	$110
General Manager	SIERRA ON-LINE, Sierra On-Line Bldg., Coarsegold, CA 93614, (209) 683-6858	Apple II/II plus/IIe	$229
IBM 5	MICRO ARCHITECT, INC., 6 Great Pine Ave., Burlington, MA 01803, (617) 273-5658	IBM PC TRS-80 Models I/III/4	$99
Mini Jini Record Keeper	JINI MICRO-SYSTEMS, Box 274, Kingsbridge Station, Riverdale, NY 10463, (212) 796-6200	Commodore 64/VIC-20	$89
The Organizer	TIMEX COMPUTER CORP., P.O. Box 2655, Waterbury, CT 06725, (203) 573-5000	TS 1000/1500	$16
PFS: File	SOFTWARE PUBLISHING, 1901 Landings Dr., Mountain View, CA 94043, (415) 962-8910	IBM PC, TI-99/4A Apple II/II plus/IIe Apple III	$140 $125 $175
Profile III plus	TANDY CORP., 400 Atrium, One Tandy Center, Ft. Worth, TX 76102, (817) 338-2395	TRS-80 Models III/4 in III mode	$199
VisiDex	VISICORP, 2895 Zanker Rd., San Jose, CA 95134, (408) 946-9000	Apple II/II plus/IIe TI-99/4A	$250
VisiFile	VISICORP, 2895 Zanker Rd., San Jose, CA 95134, (408) 946-9000	Apple II/II plus/IIe, IBM PC, TI-99/4A	$250

TRIBUTIONS field, specifying all donations greater than $25. You can also search on multiple fields. For instance, I needed lists of everyone who contributed more than $25 and resided outside of the district, and everyone who endorsed the candidate and gave money as well.

"When the Girl Scouts had their cookie sale, I was the neighborhood cookie manager. I created a data base that had a record for each troop's cookie managers, including name, address, and phone number. I specified a field for each kind of cookie. All I had to do was enter how many cases of cookies a troop ordered, and then multiply the number of cases times the cost of the case and make a new field out of the total. There were 22 troops. A one-page report listed every troop number and how much profit was shown.

"The data base takes a while to set up, and then you just have to update it. All it takes is time—time and typing," Karen corrected herself. "The work comes in cycles—the beginning of the school year, election times: then it goes away. For periods of weeks, I may not touch the data bases. But if you don't update regularly, you might as well throw it in the trash."

Data-base management can become a catchy activity; it did in Karen's neighborhood. "As a result of seeing what our computer does, Susan's Girl Scout leader has bought an Apple," says Karen. "I can step back and get involved in something else . . ." Karen said, en route to showing the troop leader how to hook up her new printer. FC

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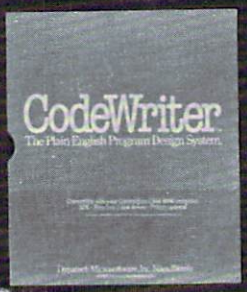

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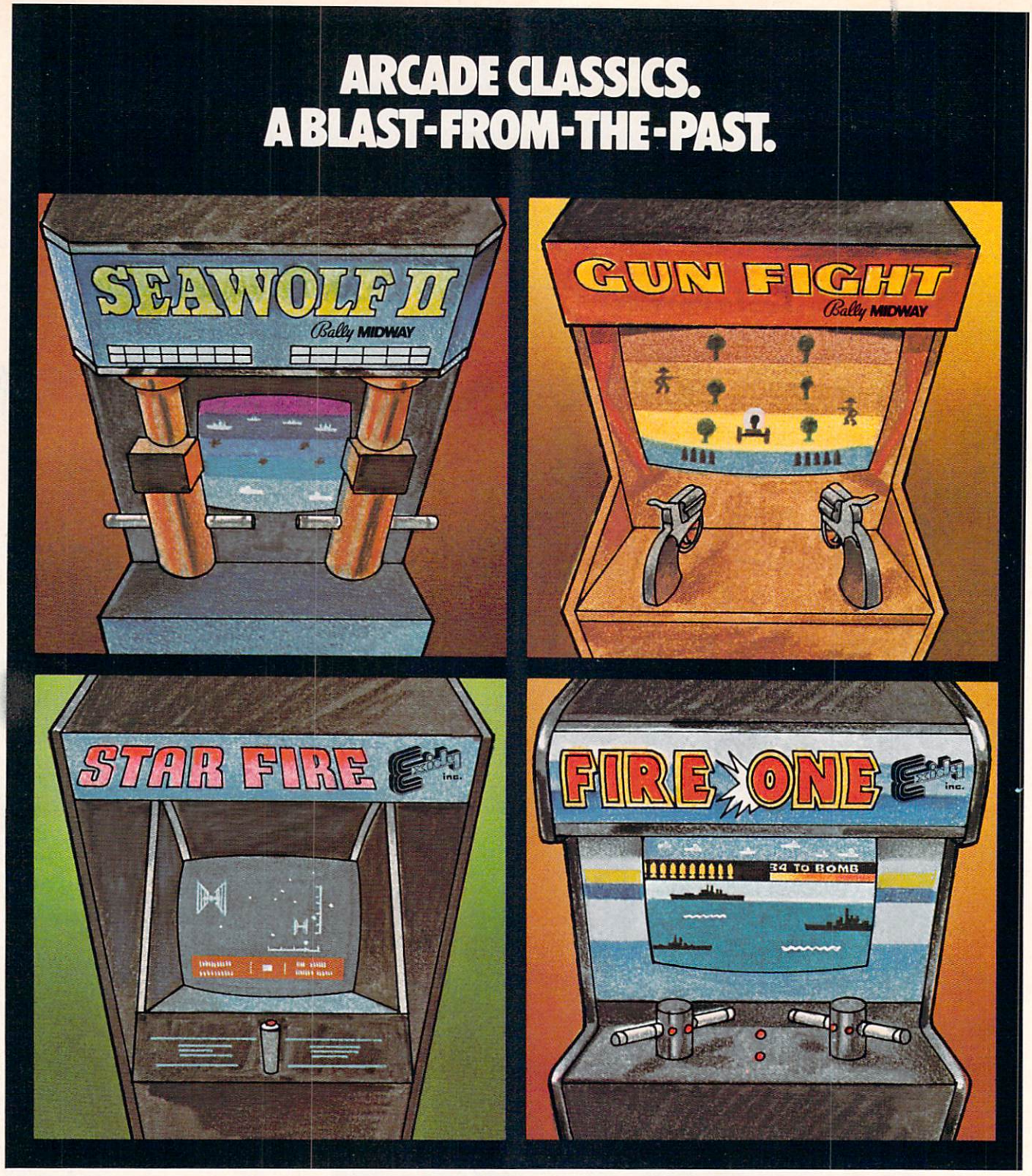

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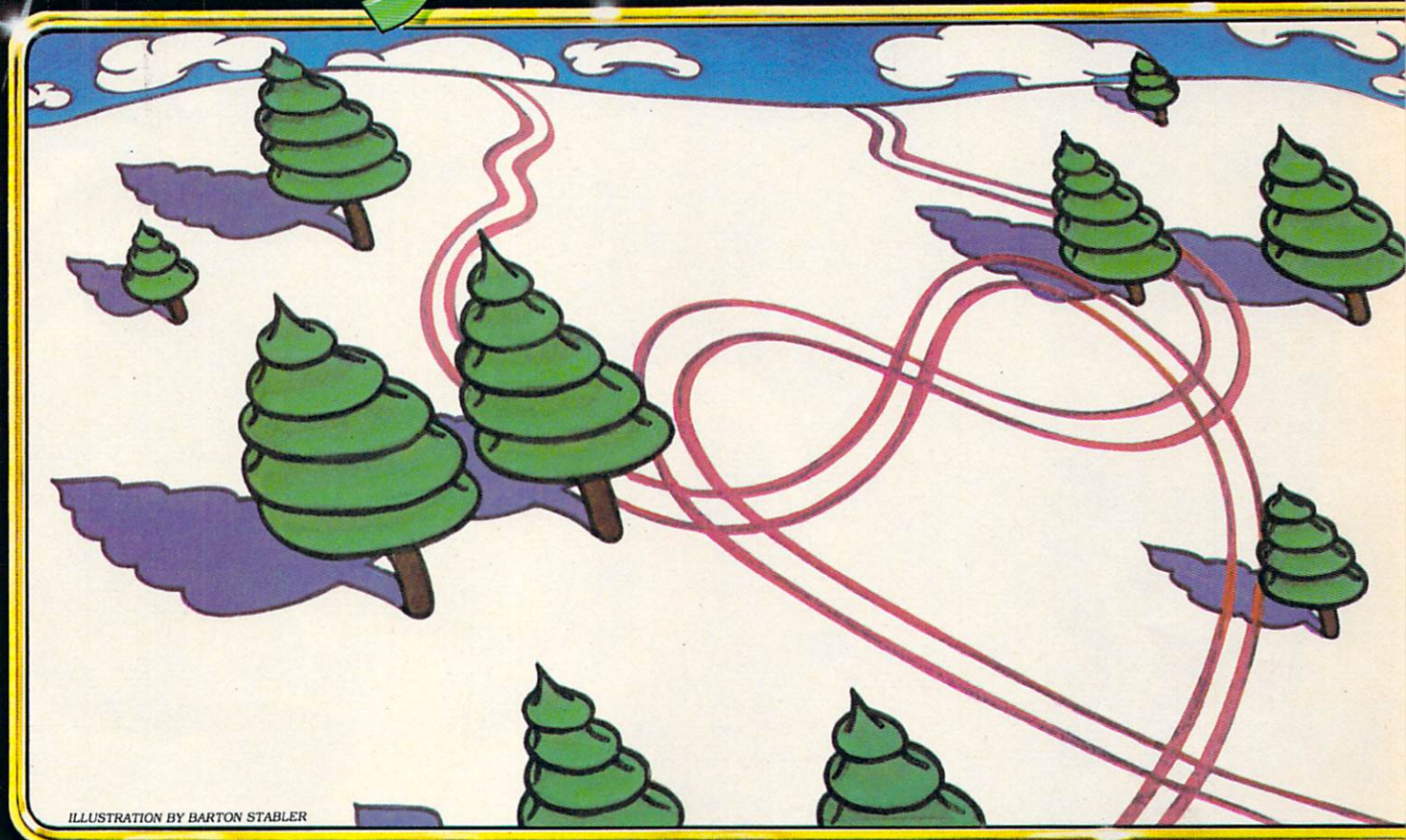

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★ FEBRUARY ★

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TIMEX sinclair 2068

PERSONAL VALENTINE

BY JOEY LATIMER

It's Valentine's Day. Cancel the order for a dozen roses, return the chocolate hearts, and throw away the sappy cards. Turn your marvel of technology into a computing Cupid. Design a personalized message for that special someone.

ADAM/*Personal Valentine*

```
100 HOME
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <RETURN> AFTER EACH REPLY."
160 PRINT
170 INPUT "WHAT IS YOUR NAME? ";n$
180 PRINT
190 PRINT "WHO IS THIS VALENTINE FOR?"
200 INPUT "(8 letters or fewer, please)";f$
210 IF LEN(f$)>8 THEN 200
240 GR
250 COLOR=6
260 FOR i=0 TO 39
270 VLIN 0,39 AT i
280 NEXT i
290 COLOR=9
300 l=3
310 GOSUB 2000
320 COLOR=4
330 l=11
340 GOSUB 2000
350 COLOR=0
360 HLIN 12,29 AT 37
370 HLIN 12,29 AT 36
380 HLIN 3,8 AT 13
390 HLIN 33,38 AT 13
400 HLIN 18,23 AT 5
410 COLOR=2
420 VLIN 36,37 AT 19
430 VLIN 36,37 AT 21
440 VTAB 20
450 HTAB 5
630 PRINT "MY HEART THROBS FOR YOU"
640 HTAB 15
650 PRINT f$;"!"
660 HTAB 19-(LEN(n$)/2)
670 PRINT "Love, ";n$
680 COLOR=INT(RND(1)*16)
700 GOSUB 1000
710 COLOR=9
720 GOSUB 1000
730 GOTO 680
1000 HLIN 17,18 AT 10
1010 HLIN 23,24 AT 10
1020 HLIN 17,18 AT 11
1030 HLIN 23,24 AT 11
1040 HLIN 16,19 AT 12
1050 HLIN 22,25 AT 12
1060 HLIN 16,19 AT 13
1070 HLIN 22,25 AT 13
1080 HLIN 16,25 AT 14
1090 HLIN 16,25 AT 15
1100 HLIN 17,24 AT 16
1110 HLIN 17,24 AT 17
1120 HLIN 18,23 AT 18
1130 HLIN 18,23 AT 19
1140 HLIN 18,23 AT 20
1150 HLIN 18,23 AT 21
1160 HLIN 19,22 AT 22
1170 HLIN 19,22 AT 23
1180 HLIN 20,21 AT 24
1190 HLIN 20,21 AT 25
1200 RETURN
2000 FOR i=1 TO l
2010 READ x1,y1,x2,y2
2020 FOR j=x1 to x2
2030 VLIN y1,y2 at j
2040 NEXT j
2050 NEXT i
2060 RETURN
3000 DATA 18,0,22,5,4,14,6,24,34,14,36,24,12,5,28,39,3
3010 DATA 11,7,13,4,9,10,11,6,7,8,9,8,6,10,9,10,5,12
3020 DATA 10,33,11,37,13,34,9,36,11,32,7,34,11,30,6,32
3030 DATA 11,28,5,30,10
```

Apple/*Personal Valentine*

```
100 HOME
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <RETURN> AFTER EACH REPLY."
160 PRINT
170 INPUT "WHAT IS YOUR NAME? ";N$
180 PRINT
190 PRINT "WHO IS THIS VALENTINE FOR?"
200 INPUT "(8 LETTERS OR FEWER, PLEASE) ";F$
210 IF LEN(F$)>8 THEN 200
240 GR
250 COLOR=6
260 FOR I=0 TO 39
270 VLIN 0,39 AT I
280 NEXT
290 COLOR=9
300 L=3
310 GOSUB 2000
320 COLOR=4
330 L=11
340 GOSUB 2000
350 COLOR=0
360 HLIN 12,28 AT 37
370 HLIN 12,28 AT 36
380 HLIN 2,6 AT 14
390 HLIN 34,38 AT 14
400 HLIN 18,22 AT 5
410 COLOR=2
420 VLIN 36,37 AT 19
430 VLIN 36,37 AT 21
440 VTAB 23
450 FLASH
460 HTAB 8 - (LEN(F$)/2)
630 PRINT "MY HEART THROBS FOR YOU, ";F$;"!"
640 PRINT
650 HTAB 19 - (LEN(N$)/2):PRINT "LOVE, ";N$
680 COLOR=INT(RND(1)*16)
700 GOSUB 1000
710 COLOR=9
720 GOSUB 1000
730 GOTO 680
1000 HLIN 17,18 AT 10
1010 HLIN 23,24 AT 10
```

ILLUSTRATIONS BY JOSHUA GOSFIELD

```
1020 HLIN 17,18 AT 11
1030 HLIN 23,24 AT 11
1040 HLIN 16,19 AT 12
1050 HLIN 22,25 AT 12
1060 HLIN 16,19 AT 13
1070 HLIN 22,25 AT 13
1080 HLIN 16,25 AT 14
1090 HLIN 16,25 AT 15
1100 HLIN 17,24 AT 16
1110 HLIN 17,24 AT 17
1120 HLIN 18,23 AT 18
1130 HLIN 18,23 AT 19
1140 HLIN 18,23 AT 20
1150 HLIN 18,23 AT 21
1160 HLIN 19,22 AT 22
1170 HLIN 19,22 AT 23
1180 HLIN 20,21 AT 24
1190 HLIN 20,21 AT 25
1200 RETURN
2000 FOR I=1 TO L
2010 READ X1,Y1,X2,Y2
2020 FOR J=X1 TO X2
2030 VLIN Y1,Y2 AT J
2040 NEXT J
2050 NEXT I
2060 RETURN
3000 DATA 17,0,22,5,2,14,6,24,34,14,38,24
3010 DATA 12,5,28,39,3,11,7,13,4,9,10,11,6,7,8,9,8,6
3020 DATA 10,9,10,5,12,10,33,11,37,13,34,9,36,11,32,7
3030 DATA 34,11,30,6,32,11,28,5,30,10
```

Atari/*Personal Valentine*

```
10 DIM F$(8),N$(9)
100 PRINT CHR$(125)
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <RETURN> AFTER EACH REPLY."
160 PRINT
170 PRINT "WHAT IS YOUR FIRST NAME"
180 PRINT "(8 LETTERS OR FEWER, PLEASE)"
190 INPUT N$
200 PRINT
210 PRINT "WHO IS THIS VALENTINE FOR"
220 INPUT F$
240 PRINT CHR$(125)
250 GRAPHICS 3
260 SETCOLOR 4,3,10
270 SETCOLOR 1,1,8
280 SETCOLOR 4,3,10
300 READ A,B,X,Y,KO
310 IF A=-1 THEN 390
320 COLOR KO
330 FOR RO=A TO B
340 PLOT X,RO:DRAWTO Y,RO
350 NEXT RO
360 GOTO 300
390 READ B,KO
395 HO=BA
400 COLOR KO
410 FOR A=1 TO B
420 READ X,Y,Z
430 IF X=-1 THEN 630
440 PLOT X,Y:DRAWTO Z,Y
450 NEXT A
460 GOTO 390
630 POKE 752,1
640 PRINT
650 PRINT F$
660 PRINT "       MY HEART THROBS FOR YOU";CHR$(29);
670 PRINT N$
700 HO=BA
710 BA=INT(RND(1)*15)+1
720 IF BA=11 THEN 700
730 IF BA=HO THEN 700
740 SETCOLOR 4,BA,10
750 SOUND 3,35,8,10
760 FOR D=1 TO 75
770 NEXT D
780 SOUND 3,0,0,0
790 Z=Z+1
800 FOR D=1 TO 75
810 NEXT D
820 GOTO 700
2000 DATA 0,19,0,16,3,0,19,26,39,3,0,1,24,25,3,13,19
2010 DATA 8,11,2,13,19,29,32,2,0,1,17,23,2,-1,-1,-1
2020 DATA -1,-1,35,1,12,2,28,24,2,28,10,3,30,9,4,17
2030 DATA 25,4,31,21,4,21,8,5,16,26,5,32,8,6,16,26,6
2040 DATA 32,7,7,16,26,7,33,7,8,17,25,8,33,7,9,18
2050 DATA 24,9,33,7,10,12,14,10,19,23,10,26,28,10,33
2060 DATA 7,11,12,14,11,20,22,11,26,28,11,33,7,12,12
2070 DATA 14,12,26,28,12,33,14,13,26,14,14,26,14,15
2080 DATA 26,14,16,26,14,17,26,14,18,26,14,19,26
2090 DATA -1,-1,-1
```

Commodore 64/*Personal Valentine*

```
100 PRINT CHR$(147)
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <RETURN> AFTER EACH REPLY."
160 PRINT
170 INPUT "WHAT IS YOUR NAME";N$
180 PRINT
190 PRINT "WHO IS THIS VALENTINE FOR"
200 INPUT "(8 LETTERS OR FEWER,  PLEASE)";F$
210 IF LEN(F$)>8 THEN 200
240 PRINT CHR$(147)
250 SB=1024
260 CB=55296
270 POKE 53281,2
280 POKE 53280,1
300 READ A,B,X,Y,KO
310 IF A=-1 THEN 390
320 FOR CO=A TO B
330 FOR RO=X TO Y
340 POKE CB+CO+40*RO,KO
350 POKE SB+CO+40*RO,CH
360 NEXT RO
370 NEXT CO
380 GOTO 300
390 READ A,B,KO,CH
400 IF A=-1 THEN 490
410 FOR CO=A TO B
420 READ X,Y
430 FOR RO=X TO Y
440 POKE CB+CO+40*RO,KO
450 POKE SB+CO+40*RO,CH
460 NEXT RO
470 NEXT CO
480 GOTO 390
490 PRINT CHR$(19) CHR$(5)
500 FOR T=1 TO 6
510 PRINT
520 NEXT T
530 Q=8-LEN(F$)
540 PRINT TAB(16+Q/2) F$
550 FOR T=1 TO 11
560 PRINT
580 NEXT T
590 PRINT CHR$(18) TAB(18) LEFT$(N$,1)
600 FOR T=1 TO 3
610 PRINT
620 NEXT T
630 PRINT CHR$(18) TAB(7) "MY HEART THROBS FOR YOU"
700 BA=INT(RND(1)*5)+4
710 IF BA=PEEK(53281) THEN 700
720 IF Z/2=INT(Z/2) THEN BA=2
730 POKE 53281,BA
```

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PROFESSIONAL SOFTWARE
COMMODORE 64

Name	List	Sale	Coupon
Executive Word Processor	$99.00	$69.00	$59.00
Executive Data Base	$89.00	$59.00	$46.00
20,000 Word Dictionary	$24.95	$19.95	$14.95
Electronic Spreadsheet	$89.00	$59.00	$46.00
Accounting Pack	$69.00	$49.00	$32.00
Total 5.2 Word Processor			
Tape	$69.00	$56.00	$37.00
Disk	$79.95	$63.00	$42.00
Total Text 2.6 Word Processor			
Tape	$44.95	$39.00	$26.00
Disk	$49.00	$42.00	$29.00
Total Label 2.6			
Tape	$24.95	$18.00	$12.00
Disk	$29.95	$23.00	$15.00
Programmers Helper (Disk)	$59.00	$39.00	$29.95
Basic Tutor (Tape/Disk)	$29.95	$24.95	$15.00
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(See other items in our catalog!)
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Sample SPECIAL SOFTWARE COUPON!

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Item	List	*SALE
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(*COUPON PRICE $49.00)

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This cartridge increases programming power over **8 times!!** Expands total memory to 57K (57,000 bytes). Block switches are on outside of cover! Has expansion port!! Lists for $199 **(OUR BEST BUY!)**

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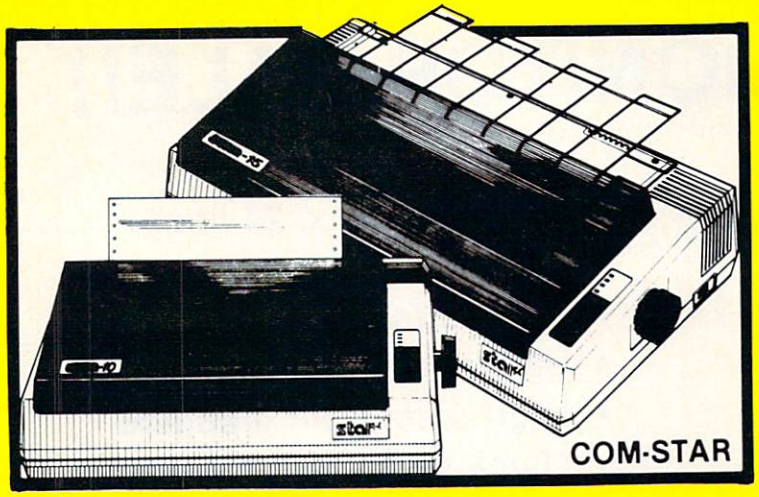

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PREMIUM QUALITY 15½" CARRIAGE PRINTER — 120 CPS Has all the features of the Premium Quality 10" Carriage T/F Printer above plus a 15½" carriage and more powerful electronic components to handle large business forms! (Centronics parallel interface)	$599	**$379**
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```
740 S=54272
750 FOR X=1 TO 23
760 POKE S+X,0
770 NEXT X
780 POKE S,1
790 POKE S+1,5
800 POKE S+24,12
810 POKE S+5,16+8
820 POKE S+4,129
830 POKE S+6,20
840 FOR T=1 TO 300
850 NEXT T
870 Z=Z+1
880 GOTO 700
2000 DATA 0,39,21,24,1,0,14,0,20,6,24,39,0,20,6,21,25
2010 DATA 1,1,6,20,23,0,0,6,15,21,0,0,9,15,21,1,1,9,6
2020 DATA 9,13,20,9,27,30,13,20,9,12,24,19,19,0,12,24
2030 DATA 20,20,12,5,10,12,12,10,26,31,12,12,10,15,21
2040 DATA 2,2,10,-1,-1,-1,-1,-1
2060 DATA 5,31,13,86,7,11,5,11,4,11,3,11,3,11,2,11,2,9
2070 DATA 2,18,2,18,2,18,3,4,3,3,3,3,3,3,4,3,3,3,2
2080 DATA 3,2,4,2,18,2,9,3,11,3,11,4,11,5,11,5,11,7,11
2090 DATA 15,23,13,86,8,18,9,18,10,18,11,18,12,18,11
2100 DATA 18,10,18,9,18,8,18,-1,-1,-1,-1,15,22,14,22
2110 DATA 13,22,12,22,-1,-1,-1,-1
```

VIC-20/*Personal Valentine*

```
10 DIM CR(5)
20 FOR I=0 TO 5
30 READ CR(I)
40 NEXT I
100 PRINT CHR$(147)
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <RETURN> AFTER"
150 PRINT "EACH REPLY."
160 PRINT
170 PRINT "WHAT IS YOUR NAME?"
180 INPUT N$
190 PRINT
200 PRINT "WHO IS IT FOR?"
210 PRINT "(7 LETTERS OR FEWER,  PLEASE)"
220 INPUT F$
230 IF LEN(F$)>7 THEN 210
240 PRINT CHR$(147)
250 SB=7680
260 CB=38400
270 POKE 36879,41
300 READ A,B,X,Y,K0
310 IF A=-1 THEN 390
320 FOR C0=A TO B
330 FOR R0=X TO Y
340 POKE CB+C0+22*R0,K0
350 POKE SB+C0+22*R0,160
360 NEXT R0
370 NEXT C0
380 GOTO 300
390 READ A,B,K0,CH
400 IF A=-1 THEN 490
410 FOR C0=A TO B
420 READ X,Y
430 FOR R0=X TO Y
440 POKE CB+C0+22*R0,K0
450 POKE SB+C0+22*R0,CH
460 NEXT R0
470 NEXT C0
480 GOTO 390
490 PRINT CHR$(19) CHR$(144)
500 FOR T=1 TO 5
510 PRINT
520 NEXT T
530 Q=7-LEN(F$)
540 PRINT TAB(8+Q/2);F$
550 FOR T=1 TO 12
560 PRINT
570 NEXT T
630 PRINT TAB(7) "MY HEART"
640 PRINT TAB(4) "THROBS FOR YOU"
650 PRINT
660 QQ=LEN(N$)/2
670 PRINT TAB(11-QQ) N$;
680 BP=36879
700 H0=BG
710 BG=CR(INT(RND(1)*6))
720 IF BG=H0 THEN 710
730 IF Z/2=INT(Z/2) THEN BG=41
740 POKE BP,BG
750 Z=Z+1
760 POKE 36878,15
770 POKE 36877,128
780 FOR D=1 TO 100
790 NEXT D
800 POKE 36878,0
810 FOR D=1 TO 100
820 NEXT D
830 GOTO 700
2000 DATA 57,73,89,105,121,137,0,7,0,17,6,15,21,0,17,6
2010 DATA 8,14,0,1,6,9,12,0,1,7,2,3,11,17,7,9,12,0,1,7
2020 DATA 2,3,11,17,7,18,19,11,17,7,9,12,2,2,3,1,4,10
2030 DATA 10,3,17,20,10,10,3,0,21,18,22,1,-1,-1,-1,-1
2040 DATA -1,1,20,5,160,5,9,4,9,3,9,3,9,2,8,2,17,2,17
2050 DATA 7,17,8,17,9,17,10,17,9,17,8,17,7,17,2,17,2,8
2060 DATA 3,9,3,9,4,9,5,9,8,14,5,160,2,4,3,3,3,3,3,4,3
2070 DATA 3,2,3,2,4,-1,-1,-1,-1
```

IBM PC w/Color Graphics Adaptor/*Personal Valentine*

```
10 KEY OFF
100 CLS
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <ENTER> AFTER EACH REPLY."
160 PRINT
170 INPUT "WHAT IS YOUR NAME";N$
190 PRINT
200 PRINT "WHO IS THIS VALENTINE FOR"
210 INPUT "(8 LETTERS OR FEWER, PLEASE)";F$
220 IF LEN(F$) > 8 THEN 210
230 SCREEN 1,0
240 COLOR 1,0
250 PI=3.141593
260 L=2
270 C=3
280 CIRCLE (150,20),20,C,,,1.25
290 PAINT (150,20),C
300 GOSUB 1000
310 L=1
320 C=1
330 GOSUB 1000
340 FOR I = 1 TO 2
350 READ C1,X1,X2,STARTANG,ENDANG,PX,PY
360 CIRCLE (C1,90),30,C,STARTANG,ENDANG
370 CIRCLE (C1,90),54,C,STARTANG,ENDANG
380 LINE (X1,90)-(X2,90),C
390 PAINT (PX,PY),C,C
400 NEXT I
410 L=4
420 C=2
430 GOSUB 1000
440 LOCATE 21,8-(LEN(F$)/2)
450 PRINT "MY HEART THROBS FOR YOU, ";F$;"!"
460 LOCATE 22,17-(LEN(N$)/2)
470 PRINT "LOVE, ";N$
480 CIRCLE (150,60),10,3,2*PI,PI+.1
490 CIRCLE (170,60),10,3,2*PI,PI
500 LINE (140,60)-(160,90),3
510 LINE (160,90)-(180,60),3
520 C=C+1
530 PAINT (150,55),C MOD 2 + 1,3
```

```
540 FOR P=1 TO 125
550 NEXT P
560 IF INKEY$ = CHR$(27) THEN END
570 GOTO 520
1000 FOR I = 1 TO L
1010 READ X1,Y1,X2,Y2
1020 LINE (X1,Y1)-(X2,Y2),C,BF
1030 NEXT I
1040 RETURN
2000 DATA 56,91,80,114,220,91,244,114,110,45,190,150
2010 DATA 110,56,80,1.57,3.14,80,85,190,220,244,6.28
2020 DATA 1.57,220,85,140,44,160,41,56,83,81,86,219
2030 DATA 83,244,86,110,136,190,140
```

TI-99/4A/*Personal Valentine*

```
10 A$="8142241818244281"
20 B$="FFFFFFFFFFFFFFFF"
30 CALL CHAR(128,B$)
40 CALL CHAR(136,B$)
50 CALL CHAR(144,A$)
60 CALL COLOR(12,13,16)
70 CALL COLOR(13,11,11)
80 CALL COLOR(14,7,7)
90 CALL COLOR(15,3,8)
100 CALL CLEAR
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <ENTER> AFTER"
150 PRINT "EACH REPLY."
160 PRINT
170 PRINT "WHAT IS YOUR FIRST NAME?"
180 PRINT "(7 LETTERS OR FEWER, PLEASE)"
190 INPUT N$
200 IF LEN(N$)>7 THEN 180
210 PRINT
220 PRINT "WHO IS THE VALENTINE FOR?"
230 INPUT F$
240 CALL CLEAR
300 READ CH,A,B
310 IF CH=-1 THEN 630
320 FOR CO=A TO B
330 READ RO,REP
340 CALL VCHAR(RO+3,CO,CH,REP)
350 NEXT CO
360 GOTO 300
630 PRINT F$
640 PRINT TAB(10);"MY HEART"
650 PRINT TAB(7);"THROBS FOR YOU"
660 PRINT TAB(22);N$;
670 CALL SCREEN(9)
700 HO=KO
710 KO=INT(RND*13)+2
720 IF KO=HO THEN 710
730 CALL COLOR(14,KO,KO)
740 CALL SOUND(500,-8,0)
750 GOTO 700
2000 DATA 128,4,7,14,7,14,7,14,7,14,7,128,25,28,14,7
2010 DATA 14,7,14,7,14,7,128,13,19,1,2,1,2,1,2,1,2,1,2
2020 DATA 1,2,1,2,144,3,29,8,5,6,7,5,8,4,9,4,9,3,10,3
2030 DATA 8,3,18,3,18,3,18,3,18,3,18,3,18,3,18,3,18,3
2040 DATA 18,3,18,3,18,3,18,3,18,3,8,3,10,4,9,4,9,5,8
2050 DATA 6,7,8,5,136,13,21,6,2,5,4,5,5,5,6,6,6,5,6,5
2060 DATA 5,5,4,6,2,120,3,8,13,1,13,1,13,1,13,1,13,1
2070 DATA 13,1,120,24,29,13,1,13,1,13,1,13,1,13,1,13,1
2080 DATA 120,13,19,3,1,3,1,3,1,3,1,3,1,3,1,3,1
2090 DATA -1,-1,-1
```

Timex Sinclair 1000 w/16K RAM Pack & Timex Sinclair 1500/*Personal Valentine*

```
100 CLS
110 SLOW
120 PRINT "COMPUTER VALENTINE"
130 PRINT
```


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```
140 PRINT "PRESS <ENTER> AFTER EACH REPLY."
160 PRINT
170 PRINT "WHAT IS YOUR NAME?"
180 INPUT N$
190 PRINT
200 PRINT "WHO IS THIS VALENTINE FOR?"
210 PRINT "(7 LETTERS OR FEWER, PLEASE)"
220 INPUT F$
230 IF LEN F$>7 THEN GOTO 220
240 CLS
250 FAST
260 FOR L=0 TO 3
270 PRINT TAB 12;CHR$ 5;TAB 18;CHR$ 133
280 NEXT L
290 FOR L=12 TO 20
300 PRINT AT L,2;CHR$ 133;TAB 6;CHR$ 5;TAB 24;CHR$
133;TAB 28 CHR$ 5
310 NEXT L
320 FOR L=4 TO 26
330 PRINT AT 3,L;CHR$ 136
340 NEXT L
350 FOR L=3 TO 27
360 PRINT AT 4,L;CHR$ 136
370 NEXT L
380 FOR L=2 TO 28
390 PRINT AT 5,L;CHR$ 136;AT 6,L;CHR$ 136
400 NEXT L
410 FOR L=7 TO 11
420 PRINT AT L,2;CHR$ 136;AT L,3;CHR$ 136;AT
L,4;CHR$ 136
430 PRINT AT L,5;CHR$ 136;AT L,6;CHR$ 136;AT
L,24;CHR$ 136
440 PRINT AT L,25;CHR$ 136;AT L,26;CHR$ 136;AT
L,27;CHR$ 136;AT L,28;CHR$ 136
450 NEXT L
460 PRINT AT 7,7;CHR$ 136;AT 7,23;CHR$ 136
470 FOR L=7 TO 17
480 PRINT AT L,8;CHR$ 136;AT L,22;CHR$ 136;AT
L,13;CHR$ 136
490 PRINT AT L,9;CHR$ 136;AT L,10;CHR$ 136;AT
L,11;CHR$ 136;AT L,12;CHR$ 136
500 NEXT L'
510 FOR L=14 TO 21
520 PRINT AT 15,L;CHR$ 136;AT 16,L;CHR$ 136;AT
17,L;CHR$ 136
530 NEXT L
540 FOR L=11 TO 15
550 PRINT AT L,14;CHR$ 136;AT L,20;CHR$ 136
560 NEXT L
570 FOR L=15 TO 19
580 PRINT AT 14,L;CHR$ 136
590 NEXT L
600 PRINT AT 13,15;CHR$ 136;AT 13,19;CHR$ 136;AT
12,15;CHR$ 136;AT 12,19;CHR$ 136
610 PRINT AT 13,16;CHR$ 136;AT 13,18;CHR$ 136
620 FOR L=7 TO 14
630 PRINT AT L,21;CHR$ 136
640 NEXT L
650 FOR L=7 TO 8
660 PRINT AT L,14;CHR$ 136;AT L,20;CHR$ 136
670 NEXT L
680 FOR L=15 TO 19
690 PRINT AT 7,L;CHR$ 136
700 NEXT L
710 PRINT AT 8,17;CHR$ 136;AT 7,17;CHR$ 136
720 FOR L=8 TO 22
730 PRINT AT 18,L;CHR$ 3;AT 20,L;CHR$ 3
740 NEXT L
750 PRINT AT 19,14;CHR$ 128;AT 19,16;CHR$ 128
760 FOR L=18 TO 20
770 PRINT AT L,8;CHR$ 133;AT L,22;CHR$ 5
780 NEXT L
790 PRINT AT 18,14;CHR$ 128;AT 18,16;CHR$ 128
800 SLOW
810 PRINT AT 19,15;N$(1);AT 10,14;F$
820 PRINT AT 21,4;"MY HEART THROBS FOR YOU"
830 PRINT AT 10,14;"       ";AT 10,14;F$
840 GOTO 830
```

TRS-80 Color Computer/*Personal Valentine*

```
100 CLS
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <ENTER> AFTER EACH REPLY."
160 PRINT
170 PRINT "WHAT IS YOUR NAME?"
180 PRINT "(EIGHT LETTERS OR FEWER, PLEASE)"
190 INPUT N$
200 IF LEN(N$)>8 THEN 180
210 PRINT
220 PRINT "WHO IS THE VALENTINE FOR?"
230 INPUT F$
240 CLS
300 READ CH,CD,B
310 IF CH=-1 THEN 630
320 FOR Z=1 TO B
330 READ X,Y
340 FOR LO=X TO Y
350 PRINT @LO,CHR$(CH+CD)
360 NEXT LO
370 NEXT Z
380 GOTO 300
630 PRINT @384,F$
640 PRINT @428,"MY HEART"
650 PRINT @457,"THROBS FOR YOU"
660 PRINT @504,N$;
670 FOR X=1 TO 7
680 READ A(X),B(X),C(X)
690 NEXT X
700 HO=CO
710 CO=RND(8)
720 IF CO=3 OR CO=HO THEN 710
730 FOR X=1 TO 7
740 FOR Y=A(X) TO B(X)
750 SET(Y,C(X),CO)
760 NEXT Y
770 NEXT X
780 GOTO 700
2000 DATA 143,16,1,13,18,143,32,1,39,44,137,64,1,45,50
2010 DATA 143,32,7,51,56,69,90,100,123,131,156,163,188
2020 DATA 195,200,202,213,137,64,1,227,232,143,16,4
2030 DATA 260,263,292,295,324,327,356,359,143,32,6
2040 DATA 215,220,234,245,266,277,298,309,330,341
2050 DATA 362,373,137,64,1,247,252,143,16,4,280,283
2060 DATA 312,315,344,347,376,379
2070 DATA -1,-1,-1
2080 DATA 26,29,6,32,35,6,24,37,8,24,37,10,26,35,12
2090 DATA 28,33,14,30,31,16
```

TRS-80 Models I & III/*Personal Valentine*

```
10 DIM XX(13),YY(13),CR(6)
20 FOR I=0 TO 5
30 READ CR(I)
40 NEXT I
100 CLS
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <ENTER> AFTER EACH REPLY."
160 PRINT
170 PRINT "WHAT IS YOUR NAME?"
180 INPUT N$
190 PRINT
200 PRINT "WHO IS THE VALENTINE FOR?"
210 PRINT "(8 LETTERS OR FEWER, PLEASE)"
220 INPUT F$
230 IF LEN(F$)>8 THEN 210
240 CLS
300 READ A,B,X,Y,CH
310 IF A=-1 THEN 390
320 FOR CO=A TO B
330 FOR RO=X TO Y
340 PRINT @ CO+RO*64,CHR$(CH);
350 NEXT RO
```

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```
360 NEXT CO
370 GOTO 300
390 CH=140
400 READ A,B
410 IF A=-1 THEN 490
420 FOR CO=A TO B
430 READ X,Y
440 FOR RO=X TO Y
450 PRINT @ CO+RO*64,CHR$(CH);
460 NEXT RO
470 NEXT CO
480 GOTO 400
490 FOR I=0 TO 12
500 READ XX(I),YY(I)
510 NEXT I
630 Q=8-LEN(F$)
640 PRINT @ 351+Q/2,F$;
650 PRINT @ 923,"MY HEART";
660 PRINT @ 984,"THROBS FOR YOU";
670 QQ=LEN(N$)/2
680 PRINT @ 863-QQ,N$;
700 HO=BA
710 BA=CR(INT(RND(0)*6))
720 IF BA=HO THEN 710
730 FOR I=0 TO 12
740 FOR RO=XX(I) TO YY(I)
750 PRINT @ I+28+RO*64,CHR$(BA);
760 NEXT RO
770 NEXT I
780 GOTO 700
2000 DATA 126,60,62,35,43,58
2010 DATA 0,22,0,12,191,41,63,0,12,191,23,40,0,0,191
2020 DATA 26,37,0,0,128,9,14,7,12,128,49,54,7,12,128
2030 DATA 26,37,1,1,153,8,15,6,6,153,48,55,6,6,153,0
2040 DATA 63,13,13,131,-1,-1,-1,-1,-1,8,55,3,5,3,5,3
2050 DATA 5,2,5,2,5,2,5,2,5,2,5,1,4,1,12,1,12,1,12
2060 DATA 1,12,1,12,1,12,1,12,1,12,1,12,2,12,2,12
2070 DATA 6,12,6,12,7,12,7,12,8,12,8,12,9,12,8,12
2080 DATA 8,12,7,12,7,12,6,12,6,12,1,12,1,12,1,12
2090 DATA 1,12,1,12,1,12,1,4,2,5,2,5,2,5,2,5,2,5
2100 DATA 3,5,3,5,3,5,28,41,2,3,2,2,2,2,2,2,2,2,2
2120 DATA 3,2,4,2,3,2,2,2,2,1,2,1,2,1,3,2,3,-1,-1
2130 DATA 4,5,3,5,3,6,3,6,3,7,4,7,5,8,4,7,3,7,3,6
2140 DATA 3,6,3,5,4,5
```

TRS-80 Model 4/*Personal Valentine*

```
10 DIM XX(20),YY(20)
20 FOR I=0 TO 5
30 READ CR(I)
40 NEXT I
100 CLS
120 PRINT "COMPUTER VALENTINE"
130 PRINT
140 PRINT "PRESS <ENTER> AFTER EACH REPLY."
160 PRINT
170 PRINT "WHAT IS YOUR NAME?"
180 INPUT N$
190 PRINT
200 PRINT "WHO IS THE VALENTINE FOR?"
210 PRINT "(8 LETTERS OR FEWER, PLEASE)"
220 INPUT F$
230 IF LEN(F$)>8 THEN 210
240 CLS
300 READ A,B,X,Y,CH
310 IF A=-1 THEN 390
320 FOR CO=A TO B
330 FOR RO=X TO Y
340 PRINT @ CO+RO*80,CHR$(CH);
350 NEXT RO
360 NEXT CO
370 GOTO 300
390 CH=140
400 READ A,B
410 IF A=-1 THEN 490
420 FOR CO=A TO B
430 READ X,Y
440 FOR RO=X TO Y
450 PRINT @ CO+RO*80,CHR$(CH);
460 NEXT RO
470 NEXT CO
480 GOTO 400
490 FOR I=0 TO 20
500 READ XX(I),YY(I)
510 NEXT I
630 Q=8-LEN(F$)
650 PRINT @ 1556,"MY HEART";
660 PRINT @ 1713,"THROBS FOR YOU";
670 QQ = LEN(N$)/2
680 PRINT @ 1479-QQ,N$;
690 PRINT @ 600+Q/2,F$;
700 HO=BA
710 BA=CR(INT(RND(0)*6))
720 IF BA=HO THEN 710
730 FOR I=0 TO 20
740 FOR RO=XX(I) TO YY(I)
750 PRINT @ I+33+RO*80,CHR$(BA);
760 NEXT RO
770 NEXT I
780 GOTO 690
2000 DATA 126,60,62,35,43,58
2010 DATA 0,23,0,17,191,58,79,0,17,191,24,57,0,1,191
2020 DATA 32,47,0,1,128,10,16,11,17,128,63,69,11,17
2030 DATA 128,32,47,2,2,153,7,19,10,10,153,60,72,10
2040 DATA 10,153,0,79,18,18,131,-1,-1,-1,-1,-1,7,72
2050 DATA 5,9,5,9,5,9,4,9,4,9,4,9,3,9,3,9,3,9,2,9
2060 DATA 2,9,2,9,2,9,2,8,2,8,2,17,2,17,2,17,2,17
2070 DATA 2,17,2,17,2,17,2,17,2,17,2,17,3,17,8,17
2080 DATA 8,17,8,17,9,17,9,17,10,17,10,17,11,17
2090 DATA 11,17,11,17,12,17,11,17,11,17,11,17,10,17
2100 DATA 10,17,9,17,9,17,8,17,8,17,8,17,2,17,2,17
2110 DATA 2,17,2,17,2,8,2,8,2,9,2,9,2,9,2,9,3,9
2120 DATA 3,9,3,9,4,9,4,9,4,9,5,9,5,9,5,9,33,53
2130 DATA 3,4,3,4,3,3,3,3,3,3,3,3,3,3,3,3,3,4,3,4
2140 DATA 3,5,3,4,3,4,3,3,3,3,2,3,2,3,2,3,2,3,2,4
2150 DATA 2,4,-1,-1,5,7,5,7,4,7,4,8,4,8,4,9,4,9
2160 DATA 4,10,5,10,5,10,6,11,5,10,5,10,4,10,4,9
2170 DATA 4,9,4,8,4,8,4,7,5,7,5,7
```

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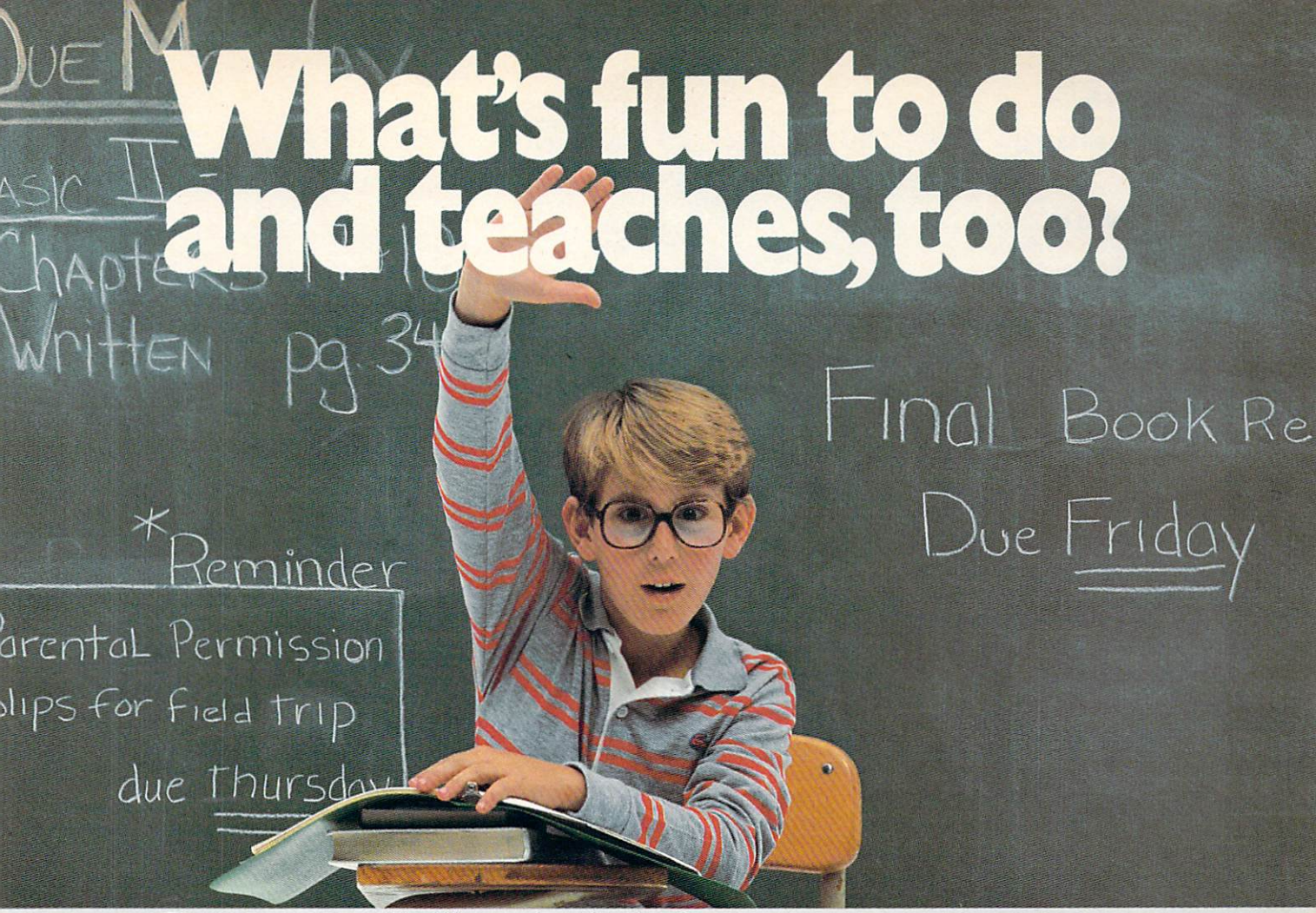

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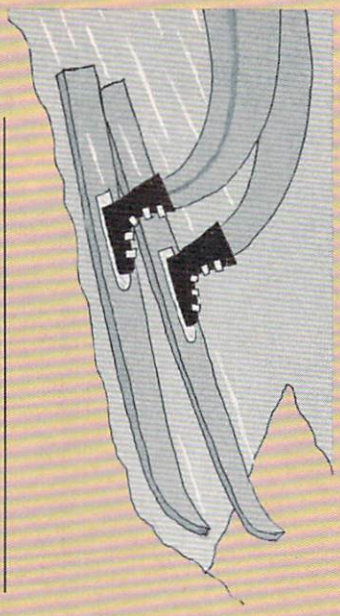
SKI TREK

BY JOEY LATIMER



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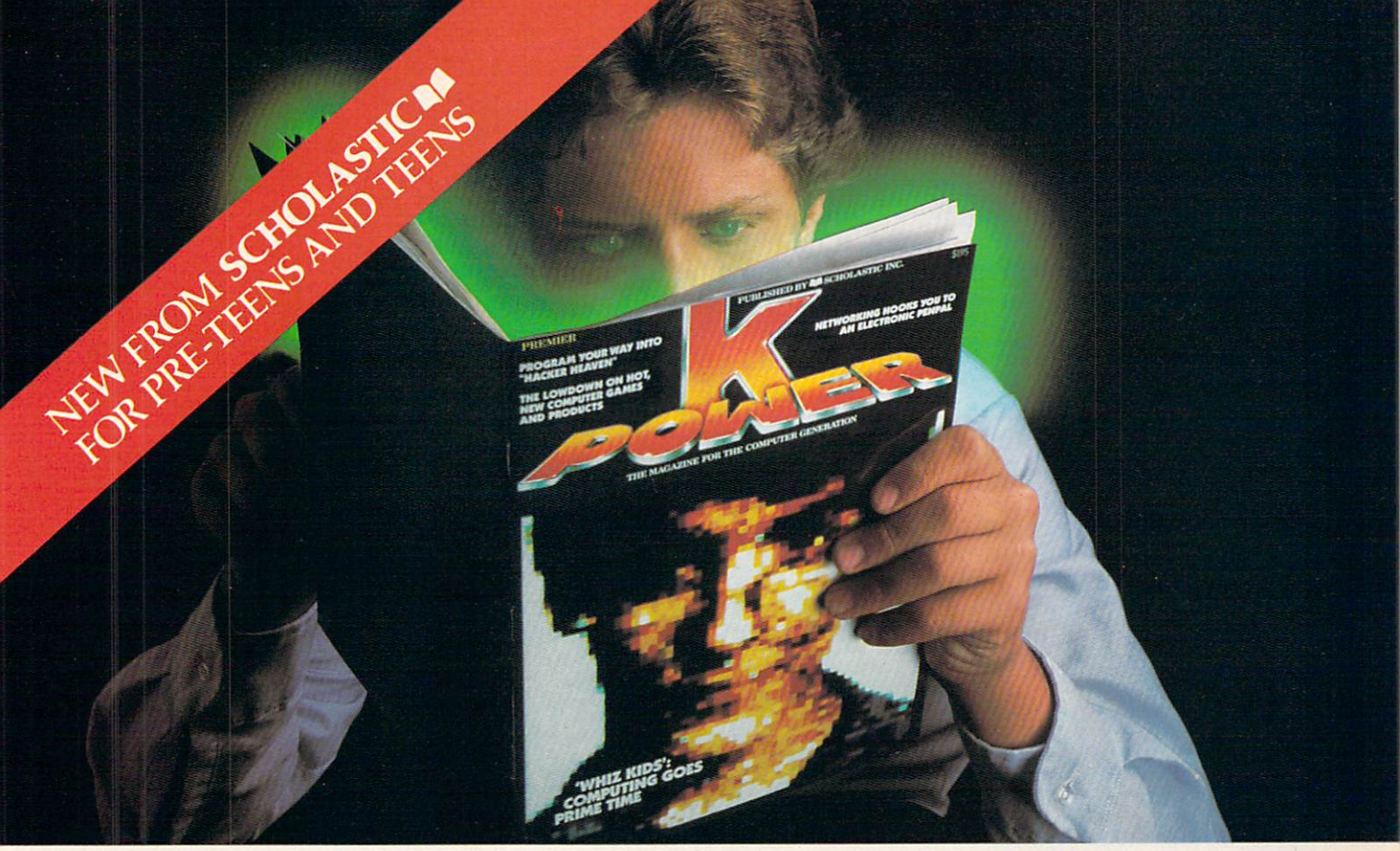
ADAM/*Ski Trek*

```
80 HOME
130 PRINT TAB(9);"THE SKI GAME"
140 FOR t=1 TO 1500
150 NEXT t
170 HOME
180 PRINT "YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "USE THE JOYSTICK TO MOVE LEFT"
250 PRINT "OR RIGHT."
270 PRINT
280 PRINT "PRESS (RETURN) TO BEGIN."
290 INPUT r$
300 HOME
330 PRINT "  GET READY!"
340 FOR t=1 TO 250
350 NEXT t
360 l=12
370 s=0
380 p=PDL(3)
400 a=INT(RND(1)*16)
410 FOR x=1 TO a
420 GOSUB 1000
440 PRINT TAB(x);CHR$(33);"              ";CHR$(33)
450 IF l<=x THEN 2000
460 NEXT x
470 FOR y=a TO 1 STEP -1
480 GOSUB 1000
500 PRINT TAB(y);CHR$(33);"              ";CHR$(33)
510 IF l>=y+12 THEN 2000
520 NEXT y
530 GOTO 400
1000 m=PDL(3)
1010 IF m<p THEN l=l-1
1020 IF m>p THEN l=l+1
1030 p=m
1040 HTAB l
1050 PRINT "H"
1060 s=s+1
1070 FOR t=1 TO 10
1080 NEXT t
1100 PRINT CHR$(8);CHR$(32)
1120 RETURN
2000 REM
2010 PRINT TAB(l);"*"
2030 PRINT
2050 PRINT "  C R A S H!"
2070 PRINT
2090 PRINT "YOU WENT ";s;"YARDS."
2100 IF s>h THEN h=s
2120 PRINT "THE HIGH SCORE IS";h;"."
2140 PRINT
2160 PRINT "PRESS (RETURN) TO PLAY AGAIN."
2180 INPUT r$
2210 GOTO 300
```

Apple/*Ski Trek*

```
80 HOME
130 PRINT TAB(12)"THE SKI GAME"
140 FOR T = 1 TO 1500
150 NEXT T
170 HOME
180 PRINT "YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING..."
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT."
270 PRINT
280 PRINT "PRESS (RETURN) TO BEGIN."
290 INPUT R$
300 HOME
330 PRINT " GET READY!"
340 FOR T = 1 TO 2500
350 NEXT T
360 L = 12
370 S = 0
400 A = INT(RND(1)*24)
410 FOR X = 1 TO A
420 GOSUB 1000
440 PRINT TAB(X); CHR$(33);"             "; CHR$(33)
450 IF L <= X THEN 2000
460 NEXT X
470 FOR Y = A TO 1 STEP -1
480 GOSUB 1000
500 PRINT TAB(Y); CHR$(33);"             "; CHR$(33)
510 IF L >=Y + 12 THEN 2000
520 NEXT Y
530 GOTO 400
1000 M = PEEK(-16384)
1010 IF M = 194 THEN L = L - 1
1020 IF M = 206 THEN L = L + 1
1040 HTAB(L)
1050 PRINT "H"
1060 S = S + 1
1070 FOR T = 1 TO 20
1080 NEXT T
1100 PRINT CHR$(8); CHR$(32)
1120 RETURN
2000 REM
2010 PRINT TAB(L)"*"
2030 PRINT
2050 PRINT "  CRASH!"
2060 PRINT
2070 PRINT
2090 PRINT "YOU WENT "S" YARDS."
2100 IF S > H THEN H = S
2120 PRINT "THE HIGH SCORE IS "H"."
2140 PRINT
2160 PRINT "PRESS (RETURN) TO PLAY AGAIN."
2180 INPUT R$
2210 GOTO 300
```



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Atari/*Ski Trek*

```
20 DIM M$(1),R$(1),SP$(40)
30 SP$=" "
40 SP$(40)=SP$
50 SP$(2)=SP$
60 POKE 752,1
80 PRINT CHR$(125)
130 PRINT SP$(1,12);"THE SKI GAME"
140 FOR T=1 TO 250
150 NEXT T
170 PRINT CHR$(125)
180 PRINT "YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING ..."
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT."
270 PRINT
280 PRINT "PRESS (RETURN) TO BEGIN."
290 INPUT R$
300 PRINT CHR$(125)
310 POKE 766,1
330 PRINT "  GET READY!"
340 FOR T=1 TO 1000
350 NEXT T
360 L=8
370 S=0
400 A=INT(RND(1)*24)+1
410 FOR X=1 TO A
420 GOSUB 1000
440 PRINT SP$(1,X);CHR$(28);"          ";CHR$(28)
450 IF L<=X THEN 2000
460 NEXT X
470 FOR Y=A TO 1 STEP -1
480 GOSUB 1000
500 PRINT SP$(1,Y);CHR$(28);"          ";CHR$(28)
510 IF L>=Y+12 THEN 2000
520 NEXT Y
530 GOTO 400
1000 M=PEEK(764)
1010 IF M=21 THEN L=L-1
1020 IF M=35 THEN L=L+1
1050 PRINT SP$(1,L);"H";
1060 S=S+1
1070 FOR T=1 TO 20
1080 NEXT T
1090 POKE 766,0
1100 PRINT CHR$(126)
1110 POKE 766,1
1120 RETURN
2000 REM
2010 PRINT SP$(1,L);"*";
2030 PRINT
2050 PRINT "  C R A S H!"
2070 PRINT
2090 PRINT "YOU WENT ";S;" YARDS."
2100 IF S>H THEN H=S
2120 PRINT "THE HIGH SCORE IS ";H;"."
2140 PRINT
2160 PRINT "PRESS (RETURN) TO PLAY AGAIN."
2180 INPUT R$
2190 POKE 766,0
2210 GOTO 300
```

Commodore 64/*Ski Trek*

```
80 PRINT CHR$(147)
130 PRINT TAB(12) "THE SKI GAME"
140 FOR T=1 TO 1500
150 NEXT T
170 PRINT CHR$(147)
180 PRINT "YOU ARE THE SKIER:"CHR$(156)"H"
190 PRINT
200 PRINT CHR$(159) "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING..."
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT"
270 PRINT
280 PRINT "PRESS (RETURN) TO BEGIN."
290 INPUT R$
300 PRINT CHR$(147)
310 POKE 650,128
330 PRINT "  GET READY!"
340 FOR T=1 TO 2500
350 NEXT T
360 L=12
370 S=0
390 POKE 53281,1
400 A=INT(RND(1)*24)+1
410 FOR X=1 TO A
420 GOSUB 1000
440 PRINT TAB(X) CHR$(30);CHR$(94);"          ";CHR$
(94)
450 IF L<=X THEN 2000
460 NEXT X
470 FOR Y=A TO 1 STEP-1
480 GOSUB 1000
500 PRINT TAB(Y) CHR$(30);CHR$(94);"          ";CHR$
(94)
510 IF L>Y+12 THEN 2000
520 NEXT Y
530 GOTO 400
1000 GET M$
1010 IF M$="B" THEN L=L-1
1020 IF M$="N" THEN L=L+1
1050 PRINT TAB(L) CHR$(156) "H";
1060 S=S+1
1070 FOR T=1 TO 20
1080 NEXT T
1100 PRINT CHR$(20)
1120 RETURN
2000 REM
2010 PRINT TAB(L) CHR$(28) "*"
2030 PRINT
2050 PRINT CHR$(156) "  C R A S H!"
2080 PRINT
2090 PRINT "YOU WENT "S" YARDS"
2100 IF S>H THEN H=S
2120 PRINT "THE HIGH SCORE IS "H"."
2160 PRINT "PRESS (RETURN) TO PLAY AGAIN"
2180 INPUT R$
2190 PRINT CHR$(159)
2200 POKE 53281,6
2210 GOTO 300
```

VIC-20/*Ski Trek*

```
80 PRINT CHR$(147)
130 PRINTTAB(4)"THE SKI GAME"
140 FOR T=1 TO 1500
150 NEXT T
170 PRINT CHR$(147)
180 PRINT "YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING...
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT."
```

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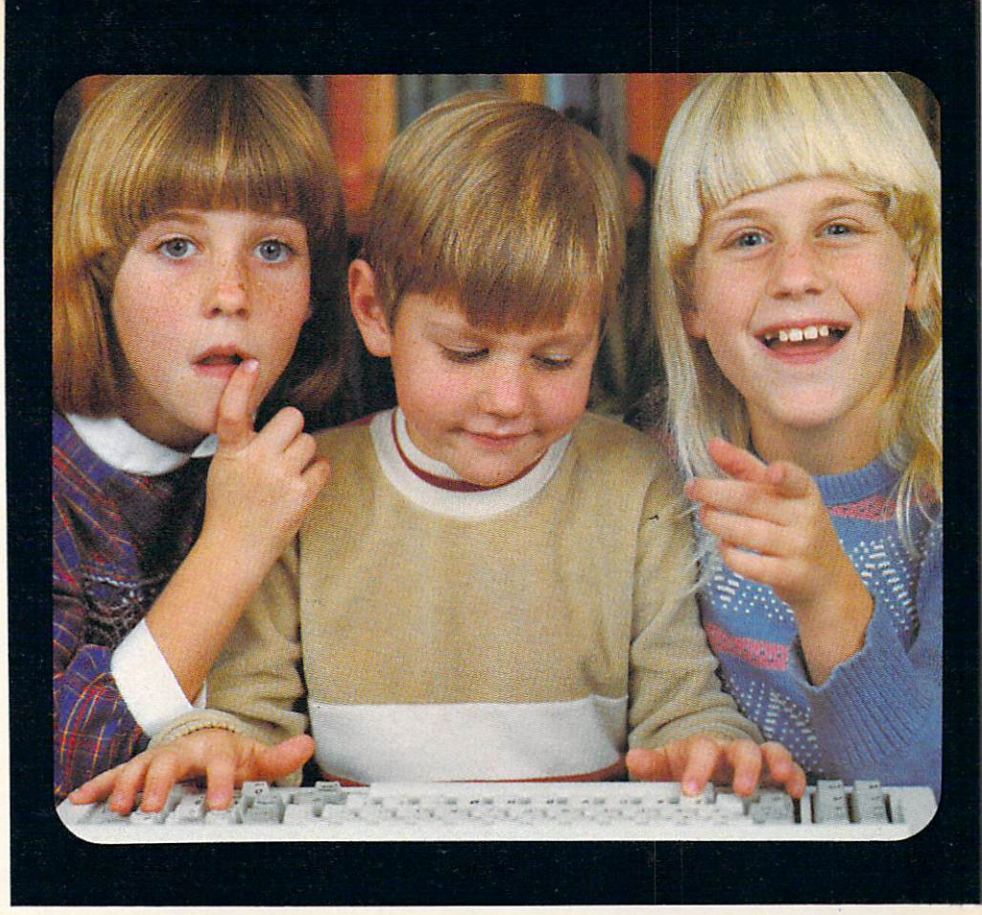

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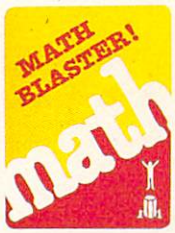

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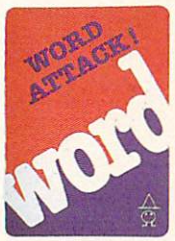

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```
270 PRINT
280 PRINT "PRESS (RETURN) TO BEGIN."
290 INPUT R$
300 PRINT CHR$(147)
310 POKE 36879,25
320 POKE 650,128
330 PRINT "  GET READY!"
340 FOR T=1 TO 2500
350 NEXT T
360 L=10
370 S=0
400 A=INT(RND(1)*9)
410 FOR X=1 TO A
420 GOSUB 1000
440 PRINT TAB(X)CHR$(30);CHR$(94);"              ";CHR$(
94)
450 IF L<=X THEN 2000
460 NEXT X
470 FOR Y=A TO 1 STEP -1
480 GOSUB 1000
500 PRINT TAB(Y)CHR$(30);CHR$(94);"              ";CHR$(
94)
510 IF L>Y+12 THEN 2000
520 NEXT Y
530 GOTO 400
1000 GET M$
1010 IF M$="B" THEN L=L-1
1020 IF M$="N" THEN L=L+1
1050 PRINT TAB(L)CHR$(144)"H";
1060 S=S+1
1070 FOR T=1 TO 40
1080 NEXT T
1100 PRINT CHR$(20)
1120 RETURN
2000 REM
2010 PRINT TAB(L)CHR$(28)"*"
2030 PRINT
2050 PRINT CHR$(156)"  C R A S H!"
2070 PRINT
2090 PRINT "YOU WENT "S" YARDS"
2100 IF S>H THEN H=S
2120 PRINT "HIGH SCORE IS"H"."
2140 PRINT
2160 PRINT "PRESS (RETURN)"
2170 PRINT "TO PLAY AGAIN."
2180 INPUT R$
2190 PRINT CHR$(159)
2200 POKE 53281,6
2210 GOTO 300
```

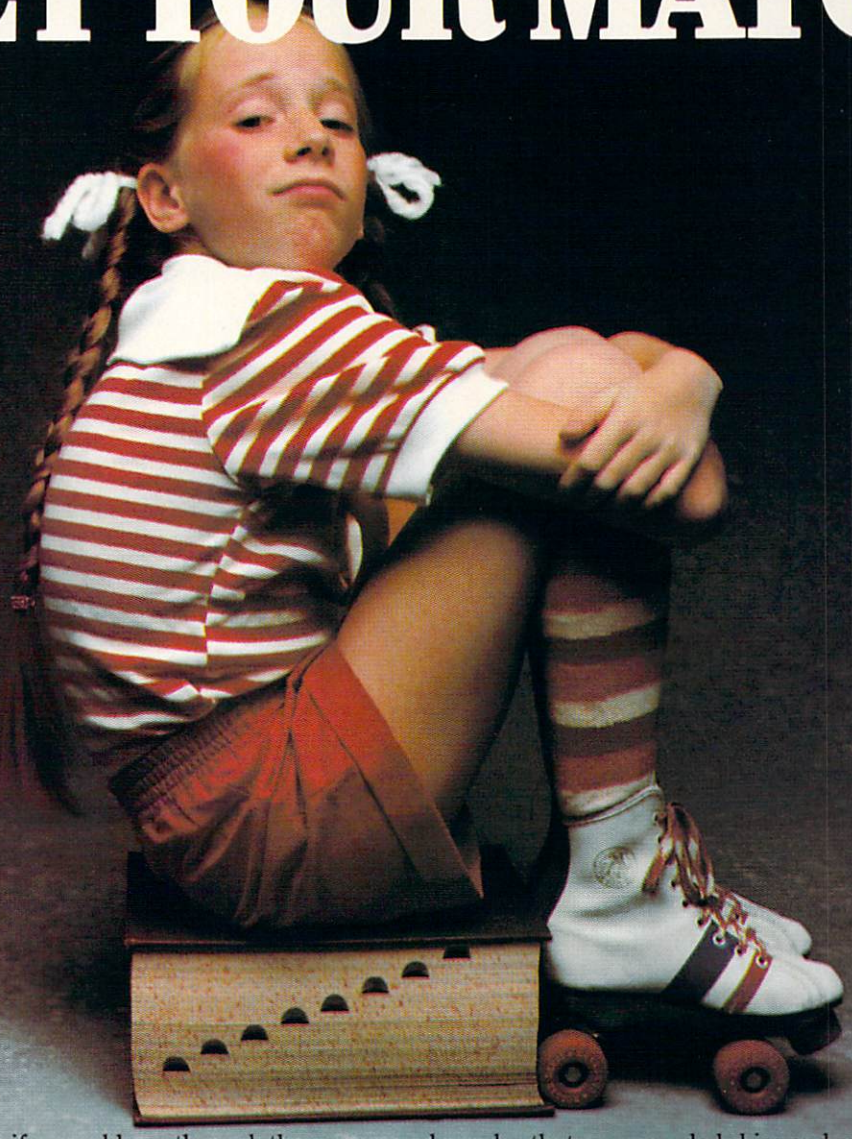
IBM PC/*Ski Trek*

```
80 RANDOMIZE (0)
90 CLS
100 SCREEN 0,0,0
110 WIDTH 40
120 COLOR 7,0,0
130 KEY OFF
140 PRINT TAB(14);"THE SKI GAME"
150 FOR T = 1 TO 1500
160 NEXT T
170 CLS
180 PRINT "YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING ..."
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT."
270 PRINT
280 PRINT "PRESS (ENTER) TO BEGIN."
290 INPUT R$
300 CLS
330 PRINT"  GET READY!"
340 FOR T = 1 TO 2500
350 NEXT T
360 L = 12
370 S = 0
400 A = INT(RND*(30+1))
410 FOR X = 1 TO A
420 GOSUB 1000
440 PRINT TAB(X);CHR$(24);"              "; CHR$(24)
450 IF L <= X THEN 2090
460 NEXT X
470 FOR Y = A TO 1 STEP -1
480 GOSUB 1000
500 PRINT TAB(Y);CHR$(24);"              "; CHR$(24)
510 IF L >= Y + 12 THEN 2090
520 NEXT Y
530 GOTO 400
1000 M$ = INKEY$
1010 IF M$ = "B" THEN L = L - 1
1020 IF M$ = "N" THEN L = L + 1
1050 PRINT TAB(L);"H"
1060 S = S + 1
1070 FOR T = 1 TO 20
1080 NEXT T
1120 RETURN
2000 REM
2010 PRINT TAB(L);"*"
2030 PRINT
2050 PRINT "  CRASH!"
2090 PRINT "YOU WENT ";S;" YARDS."
2100 IF S > H THEN H = S
2120 PRINT "THE HIGH SCORE IS";H;"."
2140 PRINT
2160 PRINT "PRESS (ENTER) TO PLAY AGAIN."
2180 INPUT R$
2210 GOTO 300
```

TI-99/4A w/TI Extended BASIC/*Ski Trek*

```
10 RANDOMIZE
80 CALL CLEAR
90 CALL CHAR(96,"00183C7EFF181818")
100 CALL COLOR(9,4,1)
130 PRINT TAB(8);"THE SKI GAME"
140 FOR T=1 TO 500
150 NEXT T
170 CALL CLEAR
180 PRINT "YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING..."
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT."
270 PRINT
280 PRINT "PRESS (ENTER) TO BEGIN."
290 INPUT R$
300 CALL CLEAR
330 PRINT "  GET READY!"
340 FOR T=1 TO 800
350 NEXT T
360 L=7
370 S=0
380 CALL SCREEN(16)
390 PRINT
400 A=INT(RND*13)+1
410 FOR X=1 TO A
420 GOSUB 1000
440 PRINT TAB(X);CHR$(96);"              ";CHR$(96)
450 IF L<=X THEN 2000
460 NEXT X
```

NOAH WEBSTER, MEET YOUR MATCH.



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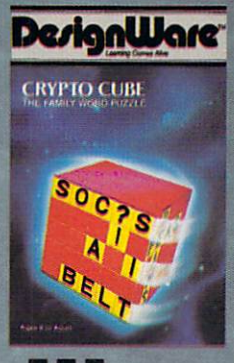

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```
470 FOR Y=A TO 1 STEP -1
480 GOSUB 1000
500 PRINT TAB(Y);CHR$(96);"            ";CHR$(96)
510 IF L>=Y+12 THEN 2000
520 NEXT Y
530 GOTO 400
1000 CALL KEY(3,M,ST)
1010 IF M=66 THEN L=L-1
1020 IF M=78 THEN L=L+1
1030 CALL HCHAR(23,L,72,1)
1060 S=S+1
1070 FOR T=1 TO 20
1080 NEXT T
1100 CALL HCHAR(23,L,32,1)
1120 RETURN
2000 REM
2010 PRINT TAB(L);"*"
2030 PRINT
2050 PRINT "  C R A S H!"
2090 PRINT "YOU WENT ";S;" YARDS."
2100 IF S>H THEN H=S
2120 PRINT "HIGH SCORE IS ";H
2160 PRINT "PRESS (ENTER) TO PLAY AGAIN."
2180 INPUT R$
2210 GOTO 300
```

Timex Sinclair 1000 w/16K RAM Pack & Timex Sinclair 1500/*Ski Trek*

```
10 RAND
70 SLOW
80 CLS
130 PRINT TAB(10):"THE SKI GAME"
140 FOR T= 1 TO 90
150 NEXT T
160 LET H=0
170 CLS
180 PRINT "YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING ..."
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT."
270 PRINT
280 PRINT "PRESS (ENTER) TO BEGIN."
290 INPUT R$
300 CLS
330 PRINT " GET READY"
340 FOR T = 1 TO 150
350 NEXT T
360 LET L = 12
370 LET S = 0
400 LET A = INT(RND*18)
410 FOR X = 1 TO A
420 GOSUB 1000
430 IF S > 10 THEN SCROLL
440 PRINT TAB(X);CHR$ 24;"            ";CHR$ 24
450 IF L <= X THEN GOTO 2000
460 NEXT X
470 FOR Y = A TO 1 STEP -1
480 GOSUB 1000
490 IF S > 10 THEN SCROLL
500 PRINT TAB(Y);CHR$ 24;"            ";CHR$ 24
510 IF L >= Y + 12 THEN GOTO 2000
520 NEXT Y
530 GOTO 400
1000 LET M$ = INKEY$
1010 IF M$ = "B" THEN LET L = L - 1
1020 IF M$ = "N" THEN LET L = L + 1
1040 IF S > 10 THEN SCROLL
1050 PRINT TAB(L);"H"
1060 LET S = S + 1
1100 PRINT AT 24-(PEEK 16442),32-(PEEK 16441);" ";
1120 RETURN
2000 SCROLL
2010 PRINT TAB(L);"*"
2020 SCROLL
2030 PRINT
2040 SCROLL
2050 PRINT "  CRASH!"
2060 SCROLL
2070 PRINT
2080 SCROLL
2090 PRINT "YOU WENT ";S;" YARDS."
2100 IF S > H THEN LET H = S
2110 SCROLL
2120 PRINT "THE HIGH SCORE IS ";H;"."
2130 SCROLL
2140 PRINT
2150 SCROLL
2160 PRINT "PRESS (ENTER) TO PLAY AGAIN."
2180 INPUT R$
2210 GOTO 300
```

TRS-80 Color Computer/*Ski Trek*

```
80 CLS
130 PRINT @ 41,"THE SKI GAME"
140 FOR T=1 TO 1500
150 NEXT T
170 CLS
180 PRINT@33,"YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING..."
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT."
270 PRINT
280 PRINT "PRESS (ENTER) TO BEGIN."
290 INPUT R$
300 CLS
330 PRINT "  GET READY!"
340 FOR T=1 TO 2500
350 NEXT T
360 L=5
370 S=0
400 A=RND(19)
410 FOR X=1 TO A
420 GOSUB 1000
440 PRINT @ (X+480),CHR$(33);"            ";CHR$(33)
450 IF L<=X THEN 2010
460 NEXT X
470 FOR Y=A TO 1 STEP -1
480 GOSUB 1000
500 PRINT @ (Y+480),CHR$(33);"            ";CHR$(33)
510 IF L>=Y+12 THEN 2010
520 NEXT Y
530 GOTO 400
1000 M$=INKEY$
1010 IF M$="B" THEN L=L-1
1020 IF M$="N" THEN L=L+1
1050 PRINT @ (L+480),"H";
1060 S=S+1
1070 FOR T=1 TO 120
1080 NEXT T
1100 PRINT CHR$(8)
1120 RETURN
2000 REM
2010 PRINT TAB(L);"*"
2030 PRINT
2050 PRINT "  C R A S H!"
2070 PRINT
```

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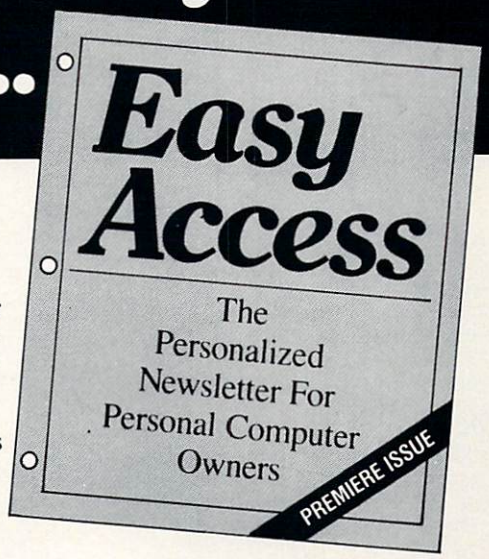

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```
2090 PRINT "YOU WENT";S;"YARDS."
2100 IF S>H THEN H=S
2140 PRINT
2160 PRINT "PRESS (ENTER) TO PLAY AGAIN."
2180 INPUT R$
2210 GOTO 300
```

TRS-80 Models I & III/*Ski Trek*

```
10 RANDOM
80 CLS
130 PRINT TAB(26) "THE SKI GAME"
140 FOR T=1 TO 1500
150 NEXT T
170 CLS
180 PRINT "YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING ..."
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT."
270 PRINT
280 PRINT "PRESS <ENTER> TO BEGIN."
290 INPUT R$
300 CLS
330 PRINT "  GET READY!"
340 FOR T=1 TO 2500
350 NEXT T
360 L=12
370 S=0
400 A=INT(RND(0)*50)
410 FOR X=1 TO A
420 GOSUB 1000
440 PRINT TAB(X) CHR$(124);"            ";CHR$(124)
450 IF L<=X THEN 2000
460 NEXT X
470 FOR Y=A TO 1 STEP -1
480 GOSUB 1000
500 PRINT TAB(Y) CHR$(124);"            ";CHR$(124)
510 IF L>=Y+12 THEN 2000
520 NEXT Y
530 GOTO 400
1000 M$=INKEY$
1010 IF M$="B" THEN L=L-1
1020 IF M$="N" THEN L=L+1
1050 PRINT TAB(L);"H";
1060 S=S+1
1070 FOR T=1 TO 20
1080 NEXT
1100 PRINT CHR$(8)
1120 RETURN
2000 REM
2010 PRINT TAB(L);"*"
2030 PRINT
2050 PRINT "   C R A S H !"
2090 PRINT "YOU WENT"S"YARDS."
2100 IF S>H THEN H=S
2120 PRINT "THE HIGH SCORE IS "H"."
2140 PRINT
2160 PRINT "PRESS <ENTER> TO PLAY AGAIN."
2180 INPUT R$
2210 GOTO 300
```

TRS-80 Model 4/*Ski Trek*

```
10 RANDOM
80 CLS
90 PRINT CHR$(15)
130 PRINT TAB(34) "THE SKI GAME"
140 FOR T=1 TO 1500
150 NEXT T
170 CLS
180 PRINT "YOU ARE THE SKIER: H"
190 PRINT
200 PRINT "FOR A HIGH SCORE,"
210 PRINT "SKI DOWN THE SLOPE"
220 PRINT "WITHOUT HITTING TREES."
230 PRINT
240 PRINT "PRESSING..."
250 PRINT "B MOVES YOU LEFT;"
260 PRINT "N MOVES YOU RIGHT."
270 PRINT
280 PRINT "PRESS (ENTER) TO BEGIN."
290 INPUT R$
300 CLS
330 PRINT "  GET READY!"
340 FOR T=1 TO 2500
350 NEXT T
360 L=12
370 S=0
400 A=INT (RND(0)*66)
410 FOR X=1 TO A
420 GOSUB 1000
440 PRINT TAB(X) CHR$(124);"            ";CHR$(124)
450 IF L<=X THEN 2000
460 NEXT X
470 FOR Y=A TO 1 STEP -1
480 GOSUB 1000
500 PRINT TAB(Y) CHR$(124);"            ";CHR$(124)
510 IF L>=Y+12 THEN 2000
520 NEXT Y
530 GOTO 400
1000 M$=INKEY$
1010 IF M$="B" THEN L=L-1
1020 IF M$="N" THEN L=L+1
1050 PRINT TAB(L);"H";
1060 S=S+1
1070 FOR T=1 TO 20
1080 NEXT
1100 PRINT CHR$(8)
1120 RETURN
2000 REM
2010 PRINT TAB(L);"*"
2030 PRINT
2050 PRINT "  C R A S H!"
2070 PRINT
2090 PRINT "YOU WENT"S"YARDS."
2100 IF S>H THEN H=S
2120 PRINT "THE HIGH SCORE IS"H"."
2140 PRINT
2160 PRINT "PRESS (ENTER) TO PLAY AGAIN."
2180 INPUT R$
2210 GOTO 300
```

TIPS TO THE TYPIST

1. When you type program lines into your computer, be sure to copy them *exactly* as written. Numbers, punctuation marks, and spaces are very important!

2. Remember to press RETURN or ENTER *after* every completed program line.

3. Run the program when you finish typing it in by typing RUN and pressing the RETURN or ENTER key. If the computer gives you an error message, don't panic. Mistakes can be fixed. List the program by typing the word LIST and pressing the RETURN or ENTER key and double-check each line. A foolproof way to correct a mistake is to type in the entire line again (including its line number). When you list the program again, you should find the new line in place of the old.

4. If you need more help, read the programming guide written for your computer. It will answer questions that can't possibly be covered here.

5. When all else fails . . . turn off the computer and relax.

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A TRICKY COURTSHIP

BY BARRY BENDAR AND JUDY HEROLD

It's February 1955 and the Sodaville High School gym is decorated with pink cardboard hearts in preparation for the big Valentine's Day dance tomorrow night. All the kids in school are looking forward to going, but two juniors, Kurt and Dede, are especially excited. They've been eyeing each other across the room in chemistry class for months now, and see the dance as their big opportunity to make their secret feelings known.

Everyone knows Dede. She's the most popular girl in the school. She's pretty, self-assured, and flirtatious, and it seems like nearly every guy at Sodaville High has a crush on her. She's never alone; there's always some suitor trailing at her heels. Dede's parents are well aware of their daughter's attractiveness, and perhaps that's why they are especially strict with their popular daughter, and sometimes even snoopy.

Dede's most recent suitor has been Bob, her brother's best friend and a senior at the school. Most girls would love to be handsome Bob's girlfriend, even though he is a terrible dancer. On the surface, cheerleader Dede and football star Bob seem like the perfect couple. But Dede's heart is elsewhere.

Kurt is different from the other boys, and that's why Dede likes him. He works after school and on weekends at a local gas station. Some kids think Kurt's a snob because he's always by himself. But Dede prefers to think of him as an individual, as someone who doesn't need to follow the crowd. And now that Dede has noticed Kurt, her best friend, Clara, has developed a crush on him, too.

A blizzard is blowing outside, but that isn't going to stop any of the kids from going to the dance. The radio says it should clear up the day after the dance. Poor visibility caused Kurt to drive into a snow bank two nights ago, and he hopes to repair his car in time for the dance. The only thing he's dreading is the dancing itself; he's self-conscious and uncoordinated on the dance floor. But he'll suffer a few jitterbugs if it will help him win Dede's heart.

True Love requires two players, preferably of the opposite sex. The male should play the character of Kurt, and the female the character of Dede.

There are nine situations to move through, starting with how to get to the dance. When *True Love* is run, first the male player will be asked how he, as Kurt, should go to the dance. The computer screen will list three numbers, which match choices listed on this page. Once the male player has selected his choice and pressed the RETURN or ENTER key, the screen will clear, and the female, as Dede, will be asked to make her selection. There is only one correct choice for each. If one or both players make the wrong choice, both will be asked to try again before they can move on to the next situation.

If you make the right moves, romance will blossom by the end of the evening. But remember: There are a lot of things to consider in starting any new relationship, and all sorts of blunders can occur to thwart budding love.

The solution will appear in next month's issue.

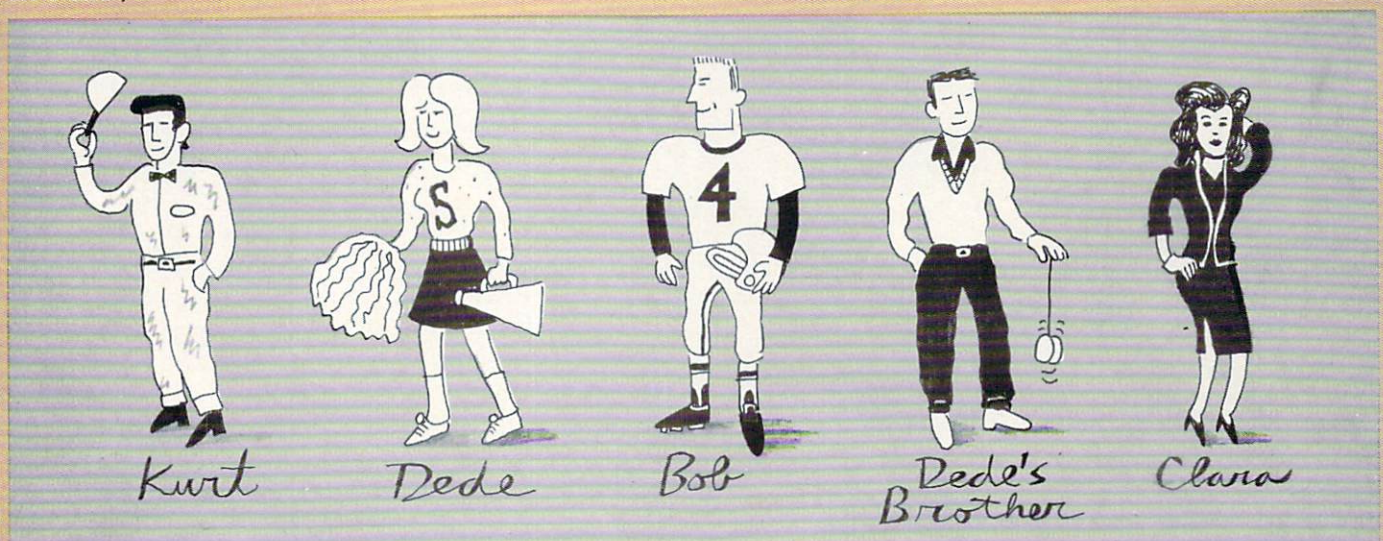
Had BARRY BENDAR *and* JUDY HEROLD *gone to their own high school dances, they might have met earlier than in college, where, to their surprise, they discovered that they'd attended the same New Jersey high school. Barry is now a programmer/analyst for Bradford National Computer Services and Judy is a freelance writer. They've been going together for four years.*

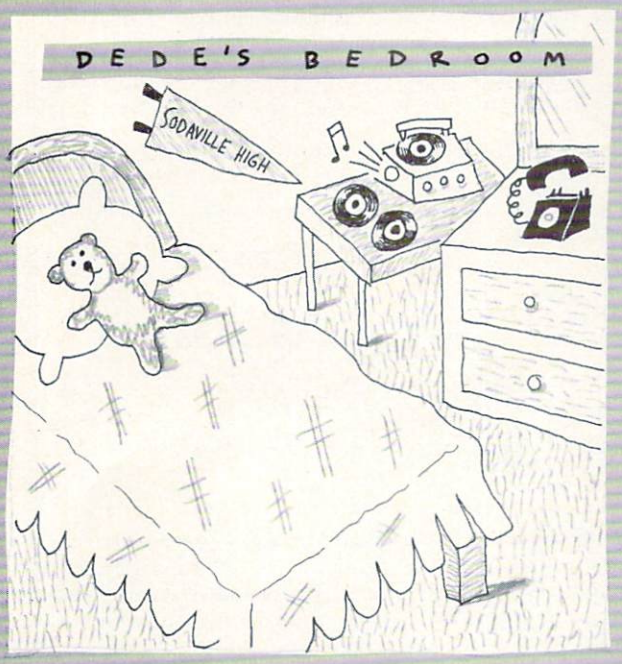
Base Version (Apple)/*True Love*

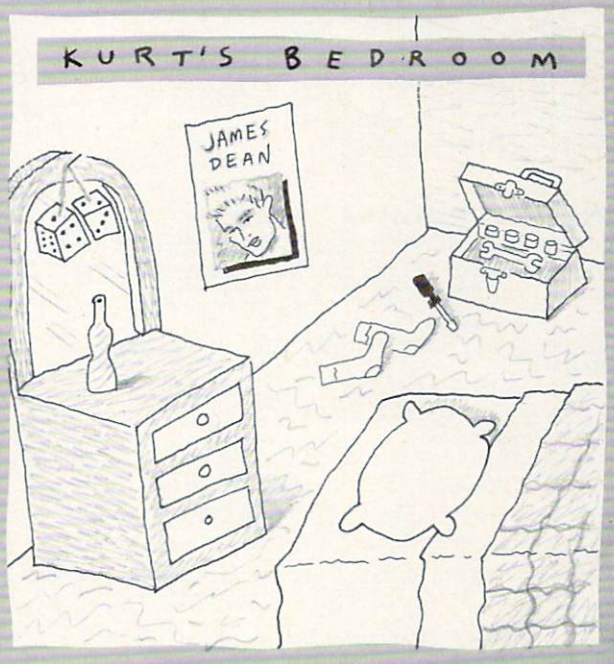
```
10 DIM ST$(18),ANS(54),SC(1),A(69):DUR = 20
20 FOR I = 1 TO 18:READ ST$(I):IF ST$(I) = "!" THEN ST$(I) =
ST$(I - 1)
30 NEXT I
40 FOR I = 0 TO 28:READ A:POKE 768 + I,A:NEXT I
50 FOR I = 1 TO 54:READ ANS(I):NEXT I
60 FOR I = 0 TO 69:READ A(I):NEXT I
90 HOME:HTAB 10:FLASH:PRINT "A TRICKY COURTSHIP":CV = 0:GOSUB
 2000:NORMAL
100 COUNT = 1:SC(0) = 1:SC(1) = 1
110 FOR LOOP = 0 TO 8
120 FOR INLP = 0 TO 1
130 HOME
140 IF INLP = 0 THEN WHO$ = "Kurt":S$ = "Boy's":RESP = LOOP *
 6 + 1:GOTO 160
150 WHO$ = "Dede":S$ = "Girl's":RESP = LOOP * 6 + 4
160 PRINT WHO$;":":PRINT
170 R$ = ST$(COUNT):GOSUB 1000
180 FOR OP = RESP TO RESP + 2:PRINT INT(ANS(OP)):NEXT OP:PRIN
T
190 PRINT S$;" choice";:INPUT CHOICE
200 QR = ANS(RESP) - INT(ANS(RESP)):QZ = INT(10 * QR + 0.1):V
 = INT(ANS(QZ + RESP - 1))
210 IF CHOICE <> V THEN SC(INLP) = SC(INLP) + 1:ERFLG = 1
220 IF INLP <> 1 OR ERFLG = 0 THEN 260
230 INLP = 0:ERFLG = 0
240 COUNT = COUNT - 1
250 PRINT:PRINT "SOMEONE GOOFED!":FOR D = 1 TO 2000:NEXT D:GO
TO 130
260 COUNT = COUNT + 1:NEXT INLP:CV = 30:GOSUB 2000:NEXT LOOP
270 HOME
280 FOR I = 0 TO 1
290 IF I = 0 THEN WHO$ = "Kurt":GOTO 310
300 WHO$ = "Dede"
310 IF SC(I) <= 3 THEN R$ = "  You are Uncommonly Cool. Top m
arks in Romance."
320 IF SC(I) > 3 AND SC(I) < 9 THEN R$ = "  In Romance, You'r
e Pretty Cool."
```

1. "I wonder if we'll get married?"
2. Ask her if she's seeing Bob
3. Mention what a lovely night it's been
4. Suggest going for a drive
5. Wait until Dede's alone to ask her to dance
6. Stand by the door
7. Your straight skirt and new blue button-down cashmere sweater
8. Go alone in the family pickup truck
9. Drive your family's Cadillac
10. Your white blazer, red shirt, and slacks
11. Stand by yourself
12. Interrupt and ask Dede to dance
13. Suggest driving gang to Burger Hop for late snack
14. Invite Kurt in for a cup of hot chocolate
15. No
16. Put your arm around her
17. "I think I'm falling in love!"
18. Yes
19. Park in front of her house
20. Mention you have to be home soon
21. Talk to your girlfriends
22. Immediately ask Dede to dance
23. Your black leather jacket, white T-shirt, and jeans
24. Get a ride in friend's new Thunderbird
25. Get ride with brother and Bob
26. Your varsity jacket and corduroys
27. Stand by bleachers with girlfriends
28. Dance with Bob
29. Ask her to get some fresh air
30. Park on nearby Lovers' Peak
31. Ask her to the football game tomorrow
32. Hold her hand
33. "I never thought this would happen!"
34. Maybe
35. Park and walk her to the front door
36. Smile shyly and look the other way
37. Dance with another girl
38. Stand by refreshment table with brother and Bob
39. Your new pink taffeta dress and high heels
40. Take your own Chevy
41. Hop a ride with friends
42. Your red pants and white angora sweater
43. Sit in the bleachers and survey the crowd
44. Talk to Bob but look distracted
45. Lock eyes with Kurt
46. You're nervous, say nothing
47. Ask her to go steady
48. Lean over and kiss her
49. Pretend to ignore Kurt and continue talking
50. Talk to your buddies
51. Suggest going bowling with your best friend and her date
52. Ask her girlfriends if they've seen her
53. Music starts up again, keep dancing
54. Ask Dede's best friend to dance

```
330 IF SC(I) >= 9 THEN R$ = "  Thoroughly Un-Cool! Better luc
k next time!"
340 PRINT WHO$;":":GOSUB 1000
350 NEXT I
360 PRINT:PRINT:PRINT "And remember ..."
370 CV = 0:DN = 1:GOSUB 2000:FOR I = 1 TO 400:NEXT I
380 HOME:HTAB 8:VTAB 10:PRINT "True Love Conquers All!"
390 FOR I = 1 TO 4:N = A(I + 65):POKE 8,N:POKE 6,100:CALL 768
:NEXT I
400 END
1000 IF LEN(R$) < 40 THEN PRINT R$:PRINT:RETURN
1010 FOR L = 1 TO 39:IF ASC(MID$(R$,L,1)) = 32 THEN J = L
1020 NEXT L
1030 PRINT LEFT$(R$,J):R$ = RIGHT$(R$, LEN(R$) - J):GOTO 1000
2000 RP = A(CV):PL = A(CV + 1):CV = CV + 1
2010 FOR X = 1 TO RP:SA = CV:FOR Y = 1 TO PL:CV = CV + 1
2020 IF DN = 1 THEN DUR = DUR - .15
2030 IF INT(CV / 2) = CV / 2 THEN POKE 6,DUR * 2:GOTO 2050
2040 POKE 6,DUR
2050 POKE 8,A(CV):CALL 768
2060 NEXT Y:CV = SA:NEXT X:CV = CV + PL + 1:IF CV >= 65 THEN
RETURN
2070 GOTO 2000
4000 DATA The Valentine's Day dance is tomorrow. How should y
ou get to the dance?,!
4010 DATA What should you wear to the dance?,!
4020 DATA You've arrived at the dance and you want to find De
de. Should you
4030 DATA You've just arrived at the dance. Should you
4040 DATA Rock around the Clock is playing. Should you,!
4050 DATA A slow ballad comes on. Should you,!
4060 DATA It was heaven dancing together. Should you
4070 DATA Dancing together was wonderful. Should you
4080 DATA The moonlight is shining through the windshield. Sh
ould you,!
4090 DATA You wonder if she's really interested in you. Shoul
d you,You reply
4100 DATA Now is your big moment. Should you,What are you thi
nking?
5000 DATA 165,8,74,133,10,164,8,173,48,192,136,234
5010 DATA 234,208,251,165,7,56,229,10,133,7,176,237
5020 DATA 198,6,208,233,96
6000 DATA 8.1,24.2,40.5,9.3,41.2,25.3,26.3,10.2,23.4
6010 DATA 39.3,7.4,42.1,6.2,43.1,52.3,38.1,27.3,11.2
6020 DATA 22.3,50.6,54.1,21.2,44.3,28.9,12.1,5.4,37.2
6030 DATA 45.1,49.2,36.2,4.1,29.3,13.1,20.1,51.3,53.1
6040 DATA 19.1,30.7,35.2,14.2,3.1,46.5,2.1,47.8,31.3
6050 DATA 15.1,34.3,18.4,16.3,32.1,48.3,1.3,33.9,17.2
7000 DATA 4,8,143,71,114,143,71,95,101,95
7010 DATA 2,8,107,53,86,107,53,72,76,72
7020 DATA 2,8,143,71,114,143,71,95,101,95
7030 DATA 1,16,95,63,75,95,107,129,122,114
7040 DATA 107,71,85,107,121,114,121,114
7050 DATA 1,16,146,71,116,146,107,146,102,71
7060 DATA 95,95,107,107,116,116,127,127
7070 DATA 95,46,56,75
```







MODIFICATIONS FOR OTHER COMPUTERS

ADAM/*True Love*

Use the base version, with the following alterations: Omit lines 40, 60, 380, 2000-2070, 5000-5020, and 7000-7070. In line 1000, change 40 to 31. In line 1010, change 39 to 30. Finally, change lines 90, 260, 370, and 390 to read as follows:

```
90 HOME:HTAB 8:PRINT "A TRICKY COURTSHIP":FOR d=1 TO 2500:NEX
T d
260 count=count+1:NEXT inlp:NEXT loop
370 FOR d = 1 TO 2500:NEXT d
390 HOME:HTAB 3:VTAB 10:PRINT "True Love Conquers All!"
```

Atari/*True Love*

Use the base version, with the following alterations: Omit lines 2050 and 5000-5020. In line 1000, change 40 to 38. Finally, change lines 10-60, 90, 130, 170, 250, 270, 370-400, 1010, 1030, 2010-2040, 2060, and 7000-7070 to read as follows:

```
10 DIM ST$(672),S(19),R$(80),ANS(54),A(69),S$(6),WHO$(4),SC(1
):POKE 752,1:VLM=15
20 FOR I=1 TO 18:S(I)=LEN(ST$)+1:READ R$:IF R$="!" THEN ST$(S
(I))=ST$(S(I-1),S(I)-1):GOTO 40
30 ST$(S(I))=R$
40 NEXT I:S(I)=LEN(ST$)+1
50 FOR I=1 TO 54:READ A:ANS(I)=A:NEXT I
60 FOR I=0 TO 69:READ A:A(I)=A:NEXT I
90 PRINT CHR$(125):POSITION 10,0:PRINT "A TRICKY COURTSHIP":C
V=0:GOSUB 2000
130 PRINT CHR$(125)
170 R$=ST$(S(COUNT),S(COUNT+1)-1):GOSUB 1000
250 PRINT :PRINT "SOMEONE GOOFED!":FOR D=1 TO 500:NEXT D:GOTO
 130
270 PRINT CHR$(125)
370 FOR I=1 TO 4:SOUND 0,A(I+65),10,10
380 FOR D=1 TO 100:NEXT D:NEXT I
390 PRINT CHR$(125):POSITION 8,10:PRINT "True Love Conquers A
LL!"
400 CV=0:DN=1:GOSUB 2000:END
1010 FOR L=1 TO 37:IF ASC(R$(L,L))=32 THEN J=L
1030 PRINT R$(1,J):R$=R$(J+1,LEN(R$)):GOTO 1000
2010 FOR X=1 TO RP:SA=CV:FOR Y=1 TO PL:CV=CV+1:VLM=VLM-(0.15*
DN):IF VLM<0 THEN RETURN
2020 SOUND 0,A(CV),10,VLM:SOUND 1,A(CV),10,VLM:SOUND 2,A(CV)+
1,10,VLM
2030 IF INT(CV/2)=CV/2 THEN FOR D=1 TO 30:NEXT D:GOTO 2060
2040 FOR D=1TO 15:NEXT D
2060 NEXT Y:CV=SA:NEXT X:CV=CV+PL+1:IF CV>=65 THEN SOUND 0,0,
0,0:SOUND 1,0,0,0:SOUND 2,0,0,0:RETURN
7000 DATA 4,8,162,81,128,162,81,108,114,108
7010 DATA 2,8,121,60,96,121,60,81,85,81
7020 DATA 2,8,162,81,128,162,81,108,114,108
7030 DATA 1,16,108,72,85,108,121,144,136,128
7040 DATA 121,81,96,121,136,128,136,128
7050 DATA 1,16,162,81,128,162,121,162,114,81
7060 DATA 108,108,121,121,128,128,144,144
7070 DATA 108,53,64,85
```

Commodore 64/*True Love*

Use the base version, with the following alterations: Omit lines 40 and 5000-5020. In line 10, change `DUR=20` to `PRINT CHR$(14)`. Add lines 70-80 and 3000-3020:

```
70 FOR I=0 TO 24:POKE 54272+I,0:NEXT I
80 POKE 54296,15:POKE 54277,57:POKE 54278,128:POKE 53281,10:P
RINT CHR$(144)
3000 HF=INT(N/256):LF=N-(HF*256)
3010 POKE 54273,HF:POKE 54272,LF
3020 POKE 54276,33:RETURN
```

Finally, change lines 90, 130, 250, 270, 370-400, 2020-2050, 4000, and 7000-7070 to read as follows:

```
90 PRINT CHR$(147):PRINT TAB(10) "A TRICKY COURTSHIP":CV=0:GO
SUB 2000
130 PRINT CHR$(147)
250 PRINT:PRINT "SOMEONE GOOFED!":FOR D=1 TO 1000:NEXT D:GOTO
 130
270 PRINT CHR$(147)
370 FOR I=1 TO 4:N=A(I+65):GOSUB 3000
380 FOR D=1 TO 500:NEXT D:POKE 54276,0:NEXT I
390 PRINT CHR$(147):PRINT TAB(255) TAB(248) "True Love Conque
rs All!"
400 CV=0:DN=1:GOSUB 2000:END
2020 N=A(CV):IF DN=1 THEN POKE 54296,INT((70-CV)/4.6)
2030 GOSUB 3000:IF INT(CV/2)=CV/2 THEN FOR D=1 TO 40:NEXT D:G
OTO 2050
2040 FOR D=1 TO 10:NEXT D:IF DN=0 THEN FOR D=1 TO 15:NEXT D
2050 POKE 54276,0
4000 DATA The Valentine's Day Dance is tomorrow. How should y
ou get there?,!
7000 DATA 4,8,1604,3212,2024,1604,3212,2408,2272,2408
7010 DATA 2,8,2144,4288,2700,2144,4288,3212,3032,3212
7020 DATA 2,8,1604,3212,2024,1604,3212,2408,2272,2408
7030 DATA 1,16,2408,3608,3032,2408,2144,1804,1908,2024
7040 DATA 2144,3212,2700,2144,1908,2024,1908,2024
7050 DATA 1,16,1604,3212,2024,1604,2144,1604,2272,3212
7060 DATA 2408,2408,2144,2144,2024,2024,1804,1804
7070 DATA 4816,9632,8096,6064
```

VIC-20 w/8K RAM Cartridge/*True Love*

Use the Commodore 64 modifications, with the following alterations: Omit lines 70, 80, and 3000-3020. In line 10, omit `:PRINT CHR$(14)`. In line 90, change `TAB(10)` to `TAB(2)`. In line 390, change `PRINT TAB(255) TAB(248)` to `PRINT TAB(220)`. In line 1000, change 40 to 22. In line 1010, change 39 to 21. In line 2040, change 10 to 20 and 15 to 30. Finally, change lines 370, 380, 2000-2030, 2060, and 7000-7070 to read as follows:

```
370 POKE 36874,0:POKE 36875,0:POKE 36878,15:FOR I=1 TO 4:POKE
 36876,A(I+65)
380 FOR D=1 TO 300:NEXT D:NEXT I:FOR D=1 TO 500:NEXT D
2000 POKE 36878,15:RP=A(CV):PL=A(CV+1):CV=CV+1
2010 FOR X=1 TO RP:SA=CV:FOR Y=1 TO PL:CV=CV+1:IF DN=1 THEN P
OKE 36878,INT((70-CV)/4.6)
2020 POKE 36875,A(CV):POKE 36876,A(CV):POKE 36874,A(CV)+1
2030 IF INT(CV/2)=CV/2 THEN FOR D=1 TO 100:NEXT D:GOTO 2050
2060 NEXT Y:CV=SA:NEXT X:CV=CV+PL+1:IF CV>=65 THEN POKE 36878
,0:RETURN
7000 DATA 4,8,175,215,191,175,215,201,199,201
7010 DATA 2,8,195,225,207,195,225,215,212,215
7020 DATA 2,8,175,215,191,175,215,201,199,201
7030 DATA 1,16,201,219,212,201,195,183,187,191
7040 DATA 195,215,207,195,187,191,187,191
7050 DATA 1,16,175,215,191,175,195,175,199,215
7060 DATA 201,201,195,195,191,191,183,183
7070 DATA 201,228,223,212
```

IBM PC/*True Love*

Use the base version, with the following alterations: Omit lines 40 and 5000-5020. In lines 130 and 270, change `HOME` to `CLS`. In line 1000, change 40 to 80. Finally, change lines 10, 90, 250, 380, 390, 1010, 2020-2050 , and 7000-7070 to read as follows:

```
10 DIM ST$(20), ANS(54), SC(1), A(70):DR=2:KEY OFF
90 CLS:LOCATE ,31:COLOR 16,7:PRINT " A TRICKY COURTSHIP ": CO
LOR 7,0:CV=0:GOSUB 2000
250 PRINT:PRINT "SOMEONE GOOFED!":FOR D=1 TO 1000:NEXT D:GOTO
 130
380 CLS:LOCATE 12,28:COLOR 16,7:PRINT "True Love Conquers All
!"
390 FOR I=1 TO 4:SOUND A(I+65),10:NEXT I
1010 FOR L= 1 TO 79:IF ASC(MID$(R$,L,1))=32 THEN J=L
2020 IF DN=1 THEN DR=DR-.005
2030 IF INT(CV/2)=CV/2 THEN D=DR*2:GOTO 2050
2040 D=DR
2050 SOUND A(CV),D
7000 DATA 4,8,196,392,247,196,392,293,270,293
7010 DATA 2,8,261,523,329,261,523,392,360,392
7020 DATA 2,8,196,392,247,196,392,293,270,290
7030 DATA 1,16,293,440,360,293,261,220,230,246
7040 DATA 261,392,329,261,230,249,230,249
7050 DATA 1,16,196,392,246,196,261,196,275,392
7060 DATA 293,293,261,261,246,246,220,220
7070 DATA 293,587,493,363
```

TI-99/4A w/TI Extended BASIC/*True Love*

Use the base version, with the following alterations: First, use a double colon (::) instead of a single colon to separate multiple statements on a single numbered program line. So, for example, you would change line 20 to read

```
20 FOR I = 1 TO 18 :: READ ST$(I) :: IF ST$(I) = "!" THEN ST$
(I) = ST$(I - 1)
```

Second, omit lines 40, 380, 2020, and 5000-5020. Third, change HOME to CALL CLEAR in lines 130 and 270. Fourth, change 40 to 28 in line 1000. Finally, change lines 10, 90, 250, 370, 390, 400, 1010, 1030, 2030-2050, and 7000-7070 to read as follows:

```
10 DIM ST$(18),ANS(54),SC(1),A(69) :: VLM=0
90 CALL CLEAR :: PRINT TAB(5);"A TRICKY COURTSHIP" :: CV=0 ::
 GOSUB 2000
250 PRINT :: PRINT "SOMEONE GOOFED!" :: FOR D=1 TO 300 :: NEX
T D :: GOTO 130
370 FOR I=1 TO 4 :: CALL SOUND(600,A(I+65),0) :: NEXT I
390 CALL CLEAR :: PRINT TAB(255):TAB(255):"True Love Conquers
 All!"
400 CV=0 :: DN=1 :: GOSUB 2000 :: END
1010 FOR L=1 TO 27 :: IF ASC(SEG$(R$,L,1))=32 THEN J=L
1030 PRINT SEG$(R$,1,J-1) :: R$=SEG$(R$,J+1,LEN(R$)-J) :: GOT
O 1000
2030 IF INT(CV/2)=CV/2 THEN DUR=180 :: GOTO 2050
2040 DUR=90
2050 VLM=VLM+(.3*DN) :: CALL SOUND(DUR,A(CV),VLM)
7000 DATA 4,8,196,392,247,196,392,294,277,294
7010 DATA 2,8,262,523,330,262,523,392,370,392
7020 DATA 2,8,196,392,247,196,392,294,277,294
7030 DATA 1,16,294,440,370,294,262,220,233,247
7040 DATA 262,392,330,262,233,247,233,247
7050 DATA 1,16,196,392,247,196,262,196,277,392
7060 DATA 294,294,262,262,247,247,220,220
7070 DATA 587,1175,988,740
```

TRS-80 Color Computer/*True Love*

Use the base version, with the following alterations: Omit lines 40, 380, 2020, and 5000-5020. In lines 130 and 270, change HOME to CLS. In line 1000, change 40 to 32. In line 1010, change 39 to 31. Finally, change lines 10, 90, 370, 390, 400, 2030-2050, and 7000-7070 to read as follows:

```
10 DIM ST$(18),ANS(54),SC(1),A(69)
90 CLS:PRINT @ 7,"A TRICKY COURTSHIP":CV=0:GOSUB 2000
370 FOR I=1 TO 4:SOUND A(I+65),10:NEXT I
390 CLS:PRINT @ 228,"True Love Conquers All!"
400 CV=0:GOSUB 2000:GOTO 400
2030 IF INT(CV/2)=CV/2 THEN DR=2:GOTO 2050
2040 DR=1
2050 SOUND A(CV),DR
7000 DATA 4,8,32,147,78,32,147,108,99,108
7010 DATA 2,8,89,176,125,89,176,147,140,147
7020 DATA 2,8,32,147,78,32,147,108,99,108
7030 DATA 1,16,108,159,140,108,89,58,69,78
7040 DATA 89,147,125,89,69,78,69,78
7050 DATA 1,16,32,147,78,32,89,32,99,147
7060 DATA 108,108,89,89,78,78,58,58
7070 DATA 108,185,170,140
```

TRS-80 Models I & III/*True Love*

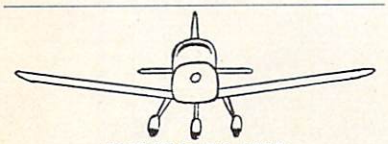
Use the base version, with the following alterations: Omit lines 40, 60, 380, 2000-2070, 5000-5020, and 7000-7070. In line 1000, change 40 to 64. In line 1010, change 39 to 63. In lines 130 and 270, change HOME to CLS. Finally, change lines 10, 90, 260, 370, and 390 to read as follows:

```
10 CLEAR 1000:DIM ST$(18),ANS(54),SC(1)
90 CLS:PRINT @ 25,"A TRICKY COURTSHIP":FOR D=1 TO 1000:NEXT D
260 COUNT=COUNT+1:NEXT INLP:NEXT LOOP
370 FOR D=1 TO 1000:NEXT D
390 CLS:PRINT @ 466, "True Love Conquers All!"
```

TRS-80 Model 4/*True Love*

Use the Model III version, with the following modifications: In line 90, change 25 to 31. In line 390, change 466 to 587. In line 1000, change 64 to 80. Finally, in line 1010, change 63 to 79.

TEXAS INSTRUMENTS 99/4A



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CONCENTRATE

BY PETER COCKCROFT

The phone may ring off the hook, the knocking may double at the door, but when you play this game, nothing, but nothing, will break your concentration!

Concentrate is a game that requires good hand-eye coordination and fast thinking. At the beginning of the game, and subsequently at the beginning of each level of play, you are presented with a field of characters arranged in a random pattern. One of these characters is selected by the computer as a "goal," and this character is printed at the bottom of the screen. As soon as the goal character has been revealed to the player, the clock starts. The object of the game is to locate the goal character in the field, move the cursor to it, and press the space bar (to register the "hit"), all in the shortest time possible. Points are subtracted for tagging a character other than the one the computer has selected for the round. Time consumed in each round is subtracted from the total time posted for the current level of play.

It sounds simple, but *Concentrate* becomes very challenging at the higher difficulty levels. A good cursor-control method is absolutely necessary to achieve high scores. For this reason, the program allows you to select any four keys for up-down-left-right cursor control, prior to starting play. You may also choose the starting level of difficulty. Players be advised—anything above level 2 is not recommended for the faint-of-heart!

After you have configured your cursor keys and selected your starting difficulty level, the computer will draw the game board on its screen. Use this time to study the board and get an idea of each character's position. Play will begin as soon as you press a key.

The screen will display how much time you have to find the current goal character, your total score, and the overall time remaining for the current level of difficulty. If this last figure decreases to zero, the game ends.

PETER COCKCROFT, *16, lives in New York City. He is president of his own mail-order software business. In between corporate shenanigans he attends Stuyvesant High School, a virtual breeding ground for hackers.*

Apple/*Concentrate*

```
10 DIM A(89):HOME:PRINT TAB(9) "C O N C E N T R A T E"
20 VTAB 4:PRINT "PRESS THE KEY YOU WANT TO USE ...":VT
AB 6:HTAB 5:PRINT "TO MOVE LEFT ";:GET L$
30 PRINT:PRINT TAB(5) "TO MOVE RIGHT ";:GET R$
40 PRINT:PRINT TAB(5) "TO MOVE UP ";:GET U$
50 PRINT:PRINT TAB(5) "TO MOVE DOWN ";:GET D$
60 HOME:PRINT "WHAT SKILL LEVEL WILL YOU START ON?"
70 PRINT "(1-9) ";:GET LL$:L = VAL(LL$):IF L < 1 OR L
> 9 THEN 70
80 T = L * 50 - 50
90 LL = INT(50 / L) + 28
100 FOR I = 0 TO LL:A(I) = 160:NEXT I
110 FOR I = LL + 1 TO 89:A(I) = I + 5:NEXT I
120 HOME:PRINT "LEVEL ";L
130 INVERSE:FOR I = 2 TO 20:VTAB I:HTAB 4:PRINT "
                    ":NEXT:NORMAL
140 FOR I = 0 TO 9
150 FOR J = 0 TO 8
160 C = INT(RND(1) * 90):IF A(C) < 2 THEN 160
170 B(I,J) = A(C)
180 IF A(C) = 160 THEN A(C) = 1:GOTO 210
190 HTAB I * 3 + 5:VTAB J * 2 + 3:PRINT CHR$(A(C))
200 A(C) = 0
210 NEXT J,I
220 VTAB 23:PRINT "PRESS ANY KEY TO BEGIN ..."
230 IF PEEK(-16384) < 128 THEN Z = RND(1):GOTO 230
240 POKE -16368, 0
250 VTAB 23:PRINT "                                   "
260 N = INT(RND(1) * 61) + 29:IF A(N) <> 0 THEN 260
270 Q$ = CHR$(N + 5)
280 TT = N / L * (10 - L):T = T + TT:IF TT < 30 THEN T
T = TT + 20
290 VTAB 1:HTAB 16:PRINT "SCORE:";:HTAB 28:PRINT "TIME
:"
300 VTAB 23:HTAB 20:FLASH:PRINT Q$:NORMAL
310 T = T - 1:TT = TT - 1
320 VTAB 1:HTAB 23:PRINT INT(S);" ";:HTAB 34:PRINT INT
(T);" "
330 HTAB 36:PRINT INT(TT);" "
340 IF T > 0 THEN 390
350 FOR P = 0 TO 200:Z = PEEK (-16336):Z = Z + 1:Z = Z
 + 1:NEXT P
360 POKE -16368, 0:VTAB 23:HTAB 20:PRINT " ":VTAB 23:P
RINT "DO YOU WANT TO TRY AGAIN? ";:GET TR$
370 IF TR$ = "Y" THEN RUN
380 END
390 X = PEEK(-16384):IF X < 128 THEN 800
400 POKE -16368, 0:X$ = CHR$(X - 128)
410 IF X$ = L$ THEN 470
420 IF X$ = R$ THEN 500
430 IF X$ = U$ THEN 530
440 IF X$ = D$ THEN 560
450 IF X$ = " " THEN 590
460 GOTO 800
470 GOSUB 1000
480 H = H - 1:IF H = -1 THEN H = 9
490 GOTO 800
500 GOSUB 1000
510 H = H + 1:IF H = 10 THEN H = 0
520 GOTO 800
530 GOSUB 1000
540 V = V - 1:IF V = -1 THEN V = 8
550 GOTO 800
560 GOSUB 1000
570 V = V + 1:IF V = 9 THEN V = 0
580 GOTO 800
590 IF CHR$(B(H,V)) <> Q$ THEN PRINT CHR$(7):T = T - 5
0:GOTO 800
600 FOR TT = TT TO 0 STEP -10
610 S = S + L:VTAB 1:HTAB 23:PRINT INT(S);" ":HTAB 36:
PRINT INT(TT);" "
620 FOR P = 0 TO 5:Z = PEEK(-16336):NEXT P
630 NEXT TT
640 VTAB V * 2 + 3:HTAB H * 3 + 5:INVERSE:PRINT CHR$(B
(H,V)):NORMAL
650 A(B(H,V) - 5) = 1
660 B(H,V) = B(H,V) + 128
670 FL = 0
680 FOR I = LL + 1 TO 89
690 IF A(I) = 0 THEN FL = 1
700 NEXT I
710 IF FL = 1 THEN 260
720 HOME:VTAB 15:HTAB 12:FLASH:PRINT "CONGRATULATIONS!
":NORMAL:VTAB 1:PRINT "LEVEL ";L;" DONE!";:HTAB 16:PRI
NT "SCORE:";:HTAB 28:PRINT "TIME:";
730 TT = T
740 FOR T = T TO 0 STEP -100
750 S = S + L * 10:VTAB 1:HTAB 23:PRINT INT(S);" ";:HT
AB 34:PRINT INT(T);" "
760 FOR P = 0 TO 5:Z = PEEK(-16336):NEXT P
770 NEXT T:T = TT
780 L = L + 1:IF L = 10 THEN VTAB 3:HTAB 9:PRINT "TOP
LEVEL COMPLETED!!":PRINT:PRINT TAB(15) "GAME OVER":END
790 GOTO 90
800 VTAB V * 2 + 3:HTAB H * 3 + 5:FLASH:PRINT CHR$(B(H
,V)):NORMAL
810 GOTO 300
1000 VTAB V * 2 + 3:HTAB H * 3 + 5
1010 IF B(H,V) > 128 THEN INVERSE:PRINT CHR$(B(H,V)):N
ORMAL:RETURN
1020 PRINT CHR$(B(H,V)):RETURN
```

Computers may be the world's best spellers, but they're the world's worst spelling teachers.

Or at least they used to be. Until Chatterbee.

Chatterbee is a unique piece of home computer software that not only makes teaching possible, it makes learning fun. For little people. And big people, too.

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It's equipped with a customized version of the S.A.M. speech synthesizer, developed by Don't Ask for Tronix to provide voice output.

Instead of drawing pictures, scrambling words, beating around the bush or playing "Hangman," Chatterbee teaches spelling the sensible, old-fashioned way.

Each word is spoken, then put in a contextual sentence. Just like a spelling bee. With one important difference.

Since there's no classroom, there's no pressure. And no embarrassment.

Each of the 2500 words have been selected from current educational literature. And there's an internal scoring system that automatically places each player at the right level of difficulty and challenge.

The external scoring system rewards success and turns the whole thing into a game, complete with music.

Chatterbee. The spelling bee without the sting.

Hear today, spell tomorrow.

By Jerry White and Randy Simon.
Developed by Don't Ask Computer Software, Inc.
for the Atari and Commodore 64 home computers.

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WHAT'S IN STORE

NEW HARDWARE ANNOUNCEMENTS*

ATARI AND COMMODORE PRINTER INTERFACES/ TS 1000 INTERCONTROLLER/ AMDEK's 3" DISK DRIVES/ BBC's ACORN COMPUTER

COMPUTERS

Acorn

MANUFACTURER: Acorn Computers Corp., 400 Unicorn Park Dr., Woburn, MA 01801; (617) 935-1190
PRICE: $995

You won't see it in the stores, but your children may see it in school. The Acorn, known in England as the British Broadcasting Corporation Microcomputer System, is designed specifically for use in schools, though Acorn intimates that it may move into the consumer market at some future date.

The Acorn is well-suited for school use, as it can be used as part of a 254-computer network, linked together with inexpensive telephone-like cables. This "Econonet" means one piece of software and several peripherals can be shared by a class, and that a teacher can interact with students from his or her desk, to make corrections or to give help.

Besides all the standard features, the Acorn has both a voice synthesizer and a sound generator; and it can use more than one microprocessor. This interesting option allows for the addition of another central processing unit to expand the memory, or to use other operating systems. Acorn has a built-in word-processing program (*VIEW*); and the computer allows programmers to mix assembly-language statements into BASIC programs.

Acorn says its computer, which dominates the school market in the U.K., is the "only computer majoring in education."

Dragon

MANUFACTURER: TANO Corp., 4301 Poche Court W., New Orleans, LA 70129; (504) 254-3500
PRICE: $399

The Dragon, originally available only in Great Britain, is now being marketed in the U.S. With 64K RAM (48K RAM available to the user for programming) and built-in Microsoft Extended Color BASIC, this computer controls nine colors in five different display modes. The "professional quality" keyboard contains a sound generator, a voice synthesizer, and automatic controls for an audio cassette recorder (for stopping and starting it).

TANO's computer has plug-in connectors for joystick controllers, and a Centronics parallel and RS232 serial interface. The Dragon connects to either a TV or color monitor and accepts solid-state software cartridges. A disk drive may be available in the future.

Included with the Dragon are nine software packages, a combination of home management, business, and entertainment programs, such as *C.C. Writer* (word processing), *C.C. Filer* (data-base management), and *Dragonquest* (game).

At this time, the Dragon is only available in some southwestern states and southern California.

INTERFACES

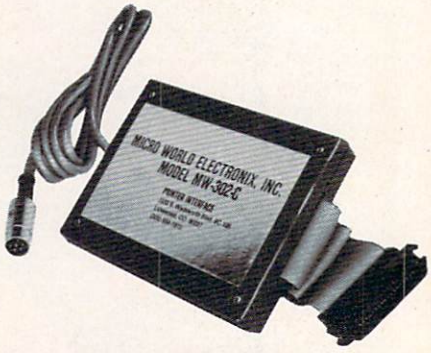
MPP-1150 Printer Interface (Atari)

MANUFACTURER: Microbits Peripheral Products, 225 West Third St., Albany, OR 97321; (503) 967-9075
PRICE: $99

This printer interface can be used instead of the Atari 800 Interface Module (which is out of stock in most stores), and allows all Atari computers to connect to any Centronics-compatible printer. The MPP-1150 interface is compatible with all software, according to the company. It comes with a three-foot cable and carries a two-year warranty.

MW-302 Printer Interface

MANUFACTURER: Micro World Electronix, 3333 S. Wadsworth Blvd., #C105, Lakewood, CO 80227; (303) 987-9532
PRICE: $119.95



The MW-302 Printer Interface allows VIC-20 or Commodore 64 computers to use any Centronics-type parallel printer or plotter. The interface connects to the serial port on both com-

** These products have been announced by manufacturers, but are not necessarily in the stores yet. Some products may still be under development, and others may be in test markets only. Call or write the manufacturer for expected date of delivery.*

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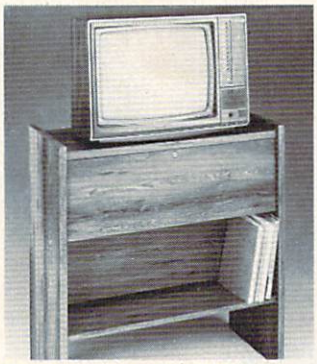
The slide out software tray has room for 14 cartridges or cassettes and up to 30 diskettes. Most brands of software will fit between the adjustable partitions with a convenient hook for the spare key at rear.
Stand fits Atari 400 & 800, Commodore 64 & VIC 20, Ti 99/4A and TRS-80.
Cabinet dimensions overall 36" high x 33-7/8" wide x 16" deep.



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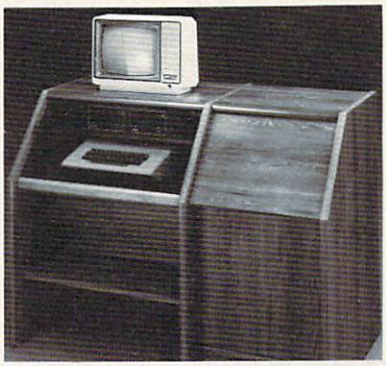

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Immediate shipment if in stock. If not, allow 3-4 weeks for delivery. If personal check is sent allow additional 2 weeks. CS-1632 ships UPS freight collect from Oregon. CS-2748 ships by truck freight collect from Oregon. Prices subject to change. Shipment subject to availability.

Both the CS-1632 and CS-2748 ship unassembled in two cartons. Assembly requires only a screwdriver, hammer, and a few minutes of your time.
Choice in simulated woodgrain of warm golden oak or rich natural walnut finish.

The two slide-out shelves put the keyboard at the proper operating height while allowing easy access to the disk drives.
The bronze tempered glass door protecting the keyboard and disk drives simply lifts up and slides back out of the way during use.
Twist tabs on the back of the center panel allow for neat concealed grouping of wires while a convenient storage shelf for books or other items lies below.
The printer sits behind a fold down door that provides a work surface for papers or books while using the keyboard. The lift up top allows easy access to the top and rear of the printer. A slot in the printer shelf allows for center as well as rear feed printers.
Behind the lower door are a top shelf for paper, feeding the printer, and a bottom shelf to receive printer copy as well as additional storage.
Stand fits same computers as the CS-1632 as well as the Apple I and II, IBM-PC, Franklin and many others.
The cabinet dimensions overall: 39-1/2" high x 49" wide x 27" deep.
Keyboard shelf 20" deep x 26" wide. Disk drive shelf 15-34" deep x 26" wide. Top shelf for monitor 17" deep x 27" wide. Printer shelf 22" deep x 19" wide.

HYTEC SYSTEMS

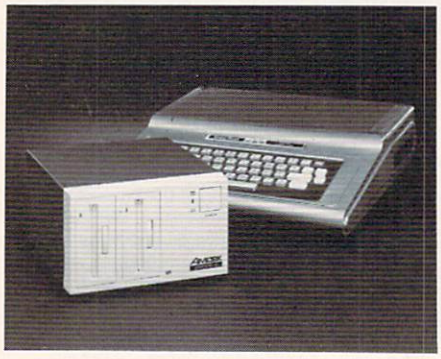
puters. Its options include printing upper- and lower-case letters, or upper-case only. The MW-302 can be used with Epson, C-Itoh, Okidata, NEC, Gemini, Smith Corona, and other printers; it's also known to work well with the *Word Pro 3 Plus* and *Paper Clip* word-processing programs.

MISCELLANEOUS

Amdisk-1 and Amdisk-111

MANUFACTURER: Amdek Corp., 2210 Lively Blvd., Elk Grove Village, IL 60007; (312) 364-1180
PRICE: $299 (Apple II); $599 (TRS-80 Color Computer)

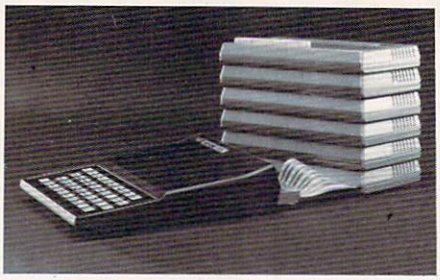
The 5¼-inch floppy disk is the standard storage medium in the computer industry, but all kinds of new formats are being devised and marketed. Amdek's new Amdisk-1, for Apple II and compatible computers, accepts 3-inch micro-floppy cartridges that can store up to 286K. While little software has been written in this format, you may use blank cartridges to store data and programs. It's meant to be used as a second disk drive, along with the regular Apple II drive.



The Amdisk-111, designed for the TRS-80 Color Computer, and compatible with Radio Shack's TRSDOS operating system, also uses 3-inch micro-floppy cartridges. These come in a hard plastic case and can store up to 624K. The Amdisk-III provides faster access time than regular 5¼-inch drives, according to Amdek. The cartridges cost $6.99 each.

BASICare Modular Expansion System

MANUFACTURER: Gladstone Electronics, 1585 Kenmore Ave., Buffalo, NY 14217; (716) 874-5510
PRICE: $59–$300 (depending on the system components)



This modular system is designed to expand the TS 1000 or TS 1500 computers into machines capable of handling advanced applications. Its cornerstone is the PERSONA, a module that acts as an interface between the computer and the other modules.

With the PERSONA and other stackable modules, the Timex can expand its memory to as much as one megabyte (1,000K), add sound, use an 80-column printer, and add user-definable characters. Future modules will include high-resolution color graphics, a 16-bit microprocessor, and a floppy disk interface.

Gladstone also plans to introduce PERSONA modules for the Commodore 64 and TS 2068.

Data Spec Joystick

MANUFACTURER: Ora Electronics, 18215 Parthenia St., Northridge, CA 91325; (213) 701-5848
PRICE: $69

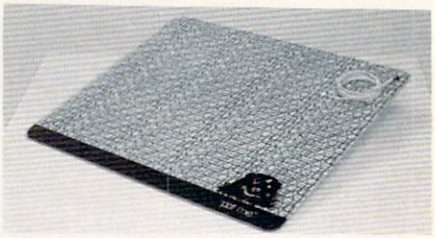
The Ora Electronics Data Spec line of joysticks is a complete line made for use with the Apple II, Apple IIe, IBM PC, and compatible computers. Model IB-XY-23 is IBM plug-compatible, and is designed to meet the

tough demand of the commercial/industrial market. This professional joystick unit has an all-metal enclosure for maximum shielding and weight stability, includes two push buttons, and comes with a four-foot cord. The joystick automatically returns to the center position when released.

Ground Hog Static Dissipative Mat

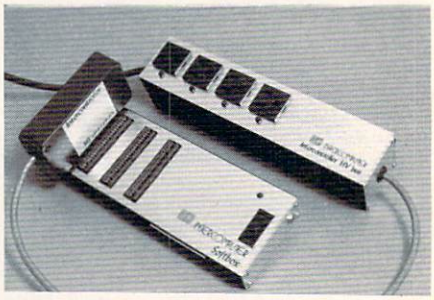
MANUFACTURER: Electronic Protection Devices, Inc., P.O. Box 673, Waltham, MA 02254; (617) 891-6602; (800) 343-1813
PRICE: $89

Because static electricity can damage a computer or cause it to lose data, and because the human body can produce as much as 30,000 volts, a variety of "anti-static" de-



vices are on the market. EPD offers the Ground Hog, a static dissipative mat. The 27½- by 23½-inch black-and-beige mat sits under the computer. Simply patting it protects the computer from any static-electricity buildup, according to the manufacturer.

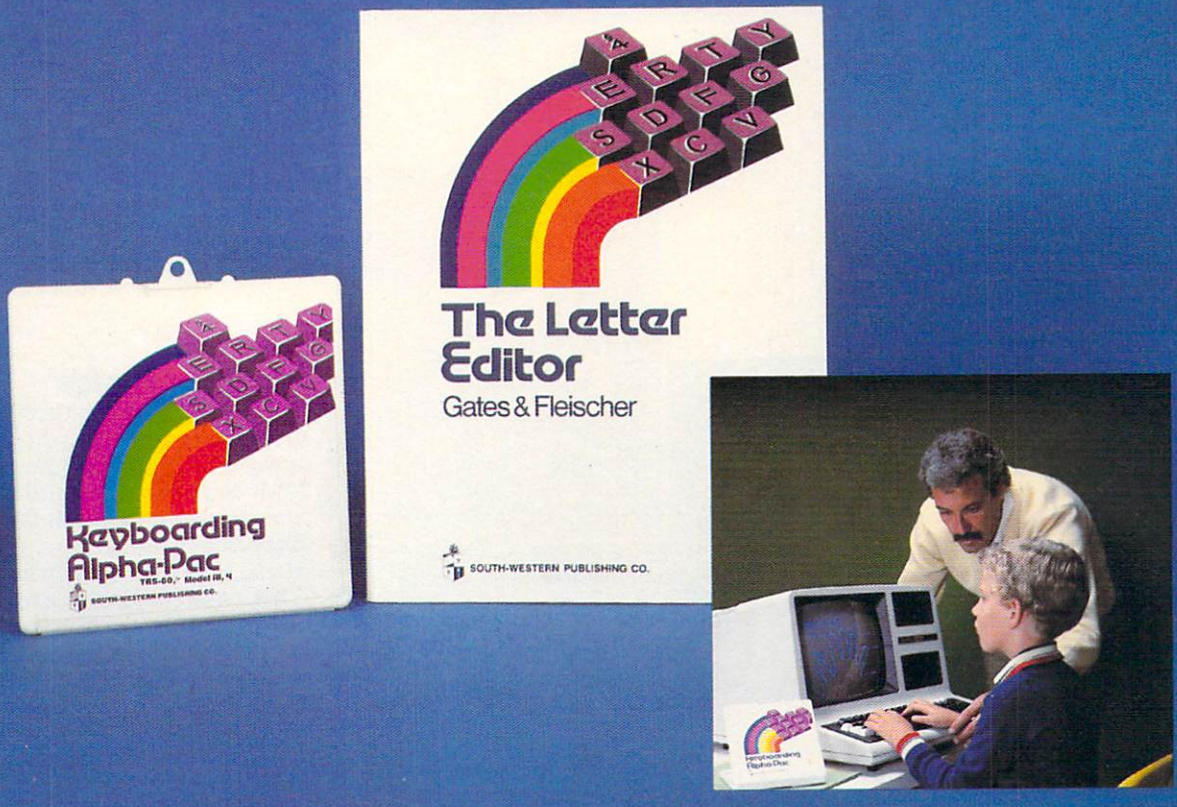
Intercontroller TS 1000



MANUFACTURER: Intercomputer, Inc., 358 Chestnut Hill Ave., Boston, MA 02146; (617) 738-5310
PRICE: $99.95 (for advanced version) plus $4.95 for shipping and handling

Through Intercontroller, the TS 1000 and 1500 computers can control various electrical devices around the house (radio, television, coffee maker, etc.), around the clock. The Intercontroller plugs into the computer's expansion port. After the user keys in a few simple BASIC commands, the Intercontroller programs each of four electrical outlets. Appliances or electrical devices plugged into the outlets will then turn on or off at an appointed time. Connecting cables are included with this home-control system. Programs stored on cartridges are necessary to run the Intercontroller.

Operating Your Home Computer Is Easy And Fun... With These Two Software Packages From South-Western



KEYBOARDING ALPHA-PAC

This exciting new touch keyboarding program teaches you the keyboard letters—from A to Z—one step at a time, and at your own pace. Through the use of animated graphics, it shows you which fingers should strike which keys and the correct way to position your hands over the keyboard.

The directions, illustrations, exercises, and user input all appear on the display screen. And for handy reference, the keyboard illustration remains on the screen for the first exercises.

When you hit the wrong key, the keyboard automatically locks up until you strike the right key, which flashes on the illustrated keyboard until you do.

This easy-to-use program includes 2 diskettes containing 18 short lessons. The lessons can be completed in no time at all because each one takes only 25 minutes to complete.

Make keyboarding easy with KEYBOARDING ALPHA-PAC—ORDER YOUR PACKAGE TODAY!

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Once you learn these commands, you can put them to use by revising, correcting, and printing the model letter, provided for your practice.

With these newly acquired commands you and your family will be able to key-in and edit all kinds of reports, essays, term papers, and a hundred other personal letters, business letters and school assignments.

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ADDRESS _____

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It's hard to stay posture-perfect during long hours at the keyboard. Do away with the backaches that come with continual pressure exerted on the spine with British Design Corp.'s new Backchair. It alleviates the ache by redistributing weight. This ergonomically correct, aesthetically pleasing chair, made of hardwood with an oak veneer, is easily assembled and available at many department stores or from the manufacturer for $99. Contact British Design Corp., 999 Green St., Suite 1905, San Francisco, CA 94133; (415) 885-4843.

THE LAST WORD ON COMPUTER LITERACY

Enhance your computer-vocabulary memory with the 1984 Computer Term-A-Day Calendar. Start each day with one of 365 words, ranging from *COBOL* ("a widely used computer language for business data processing") to *kludge* ("an inelegant part of a program"). The calendar defines a new word each day, shows correct sentence usage and pronunciation, and provides a small space for notes. It's available for $5.95 at many bookstores, including Waldenbooks and B. Dalton's, or from the manufacturer: Antioch Publishing Co., Yellow Springs, OH 45387; (513) 767-7379.

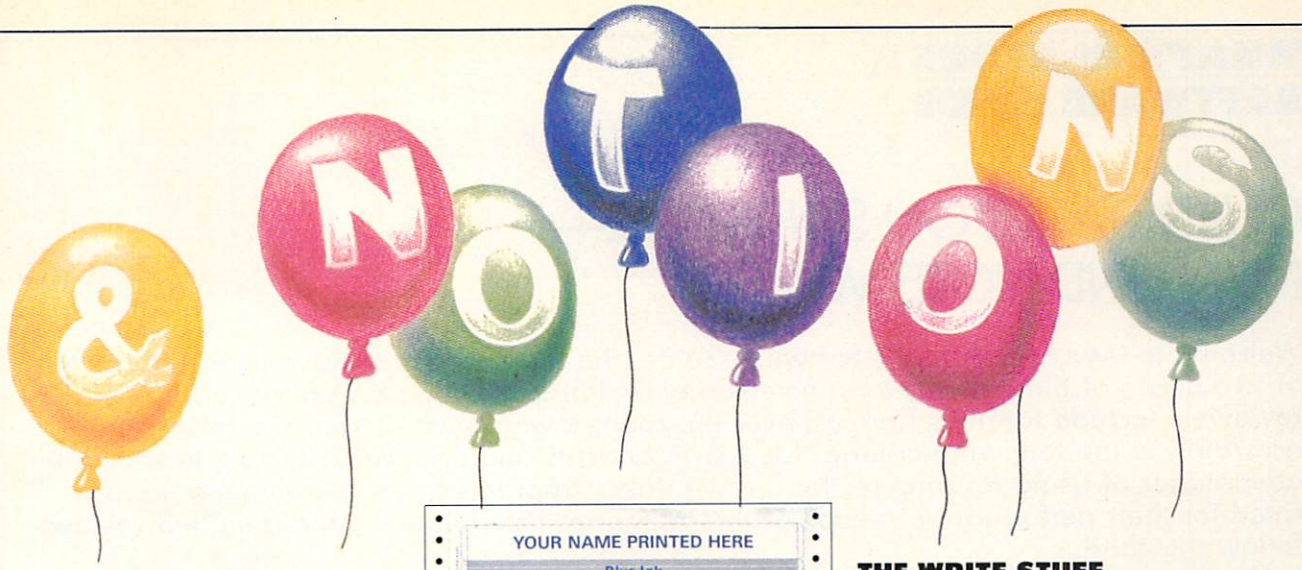
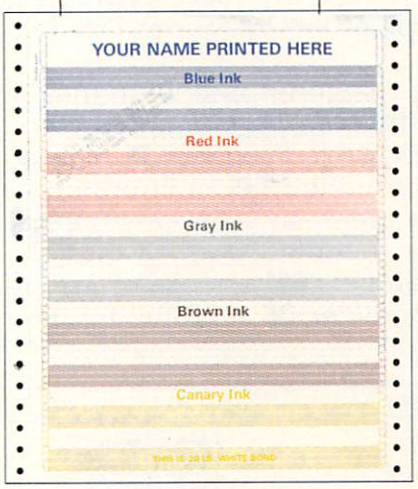


ILLUSTRATION BY KEVIN WALTER



THE WRITE STUFF

Time was, a personal-computer printout looked about as personal as a press release. Hard copy was inevitably dull and white. You'll achieve a more personal touch with Personalized Computer Paper. Choose from a variety of colors, typefaces, paper qualities, and letterheads, available for $14.95 to $54.95 for 500 sheets, at stationery stores and computer stores, or from the manufacturer. Contact Personalized Computer Paper, P.O. Box 20539, San Antonio, TX 78220; (512) 227-0585.

DISPLAYS OF EMOTION

Slot these computer cards into your mailbox. Eighteen assorted greetings transmit messages for every occasion—birthdays, anniversaries, friendship, and, of course, forgetfulness. Cards are available for $1 each at computer, gift, and stationery stores, or from the manufacturer: Byteware, P.O. Box 6725, Lawrenceville, NJ 08648; (609) 882-5769.

THE MICROCOMPUTER: A SOUND INVESTMENT

The idea of mixing Mozart and microchips may sound most unmusical, but composer Robb Murray has integrated the two in a commercial recording performed entirely on microcomputer. A 45 r.p.m. titled "Classical Mosquito" contains compositions that sound similar to Baroque music on a reed organ. Using a TRS-80 Model I, Murray programmed his compositions with music software called *Orchestra 80*. "Computer music has been possible since the 50s," reports Murray, "but the microcomputer is putting the ability to create music into the hands of almost anyone." The record is available for $4 at select computer stores or directly from the composer (postpaid)—Robb Murray, 444 St. James Place, Chicago, IL 60614; (312) 975-8020.

QUICK TAKES ON SOFTWARE— NEW AND NOTEWORTHY

Welcome to FAMILY COMPUTING's Software Guide, the most comprehensive listing available of two dozen of the newest, most noteworthy and/or best programs on the market. Our reviewers include families from all over the country who have judged the software according to the following criteria: long-term benefits and applications, adaptability, and advantages of using a computer for a given task. Programs have been evaluated and rated for their performance in each of the categories listed below. More detailed reviews follow the chart.

Here's a rundown of the rating categories and what they mean: **O** = Overall performance, and refers to the software's performance given the limitations and capacities of the particular computer for which it is intended; **D** = Documentation, or the instructions and literature that accompany a program; **EH** = Error-handling, the software's capacity to accommodate errors made by the user—an especially important consideration with software for younger users; **GQ** = Graphics quality, also evaluated in light of each particular brand's graphics capabilities; **EU** = Ease of use after the initial learning period, which varies from computer to computer; **V** = Value for money, or how the software measures up to its price.

HOME BUSINESS/HOME MANAGEMENT

Title Manufacturer Price	Brief Description	Hardware/ Equipment Required	Backup Policy	Ratings					
				O	D	EH	GQ	EU	V
EASY FINANCE I Commodore 1200 Wilson Dr. West Chester, PA 19380 (215) 431-9100 $40 © 1983	First in a series of home finance-management programs. Aids in planning and paying mortgages and loans. Easy to use, but limited in application. —AKER	Commodore 64 (disk)	Defective disks replaced free w/in 90 days.	★ ★ ★	★ ★ ★	★ ★	n/a	E	★
HOUSEHOLD BUDGET MANAGEMENT Texas Instruments P.O. Box 53 Lubbock, TX 74908 (800) 858-4075 $15.95 © 1981	Helps create a household budget and keep track of how well you adhere to it. —WILSON	TI-99/4, 99/4A (cartridge)	Defective material replaced free w/in 90 days.	★ ★	★	★	n/a	A	★ ★
QUICK BROWN FOX Quick Brown Fox 536 Broadway New York, NY 10012 (212) 925-8290 $70 (cartridge) © 1982 $75 (disk) © 1983	Logical, straightforward commands and cartridge format make this word-processing program convenient for short notes and other home uses.† —AKER	Commodore 64 (disk or cartridge); also available for VIC-20, 8K (cartridge)	Defective material replaced free w/in 90 days.	★ ★ ★	★ ★ ★	★ ★ ★	n/a	E	★ ★ ★
TALLYMASTER Prosoft P.O. Box 560 North Hollywood, CA 91603 (213) 764-3131 $129 (IBM PC) $79.95 (TRS-80) © 1983	Financial program for personal and small business use, provides worksheet that automatically tallies, calculates percentages, and so on. Takes time to master. —WHITE	TRS-80 Model I/III/4, 48K (disk); also available for IBM PC, 128K (disk)	Defective disks replaced free w/in 90 days; $5 fee if user-damaged; user makes backup copy.	★ ★ ★	★ ★	★ ★	n/a	A	★ ★ ★
TIMEWISE Atari 1312 Crossman Dr. P.O. Box 61657 Sunnyvale, CA 94806 (800) 538-8543 $29.95 © 1982	Computerized calendar keeps track of important dates—appointments, birthdays, etc. Easy to use, with clear prompts and on-screen instructions.† —JACKSON	Atari 400/800/1200, 32K (disk)	Defective disks replaced free w/in 90 days.	★ ★ ★	★ ★ ★ ★	★ ★ ★	n/a	A	★ ★ ★

RATINGS KEY **O** Overall performance; **D** Documentation; **EH** Error handling; **GQ** Graphics quality; **EU** Ease of use; **V** Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; n/a Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

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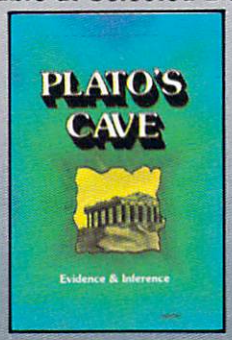

New! ALEXANDER THE GREAT

Available at last!!! *Alexander The Great* is the ultimate game for developing word and arithmetic skills, far better than Scrabble™. *Alexander The Great* permits equal competition between players at different skill levels. Complete graphics and range of options make *Alexander The Great* the best and most challenging, educational tool ever devised. Available for all microcomputers and in a board version, 48K. **$39.95**

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Spectacular game for aspiring scientists of all ages. Players probe *Plato's Cave* with light beams as they explore the relation between illusion and reality and the relation between evidence and inference. Graphic, dynamic, and challenging, with difficulty levels suitable for all, 48K. **$49.95**

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GAMES

Title Manufacturer Price	Brief Description	Hardware/ Equipment Required	Backup Policy	Ratings O	D	EH	GQ	EU	V
ARACHNOID United Microware Industries 3503 Temple Ave., Suite C Pomona, CA 91768 (714) 594-1351 $44.95 © 1983	Defend your spider's nest eggs from marauding ants and wasps in shoot-'em-up with several variations, including a time factor. Suitable for ages 8 and up. —DELSON	Commodore VIC-20 (cartridge); joystick required	Defective disks replaced free w/ in 90 days; nominal fee if user-damaged.	★★★	★★	★★★	★★	A	★★★
BROADSIDES Strategic Simulations 883 Stierlin Rd. Building A-200 Mountain View, CA 95827 (415) 964-1353 $39.95 © 1983	Command a preprogrammed warship or one you've built yourself. Set sail to defeat computer or human opponent. Ages 8+ will enjoy arcade action; 12+ can utilize more complex tactical elements.† —DELSON	Apple II/II plus/IIe/III w/ emulator, 48K (disk)	Defective or user-damaged disks replaced free w/in 30 days; $10 fee thereafter.	★★★★	★★★★	★★★★	★★★	A	★★★★
CAPTURE THE FLAG Sirius Software 10364 Rockingham Dr. Sacramento, CA 95827 (916) 366-1195 $39.95 © 1983	Take on computer or human opponent and move through 3-D, high-resolution labyrinth in search of flag. Use map or view of immediate surroundings and evade your pursuer. —DELSON	Atari 400/800/1200, 48K (disk); also available for Commodore VIC-20, (cartridge); joystick required for 2 players	Defective material replaced free w/ in 30 days; $5 fee if user-damaged.	★★★	★★	★★	★★★	A	★★★
DEFENDER ON TRI NUFEKOP P.O. Box 156 Shady Cove, OR 97539 (503) 878-2113 $12.95 © 1983	Maneuver spaceship through hazardous maze to rescue scientist. Play against the clock, avoiding traps, eliminating obstacles. Great fun and excitement for ages 8+. —DELSON	Commodore VIC-20, 3K (cassette); joystick required	Defective material replaced free w/in 90 days; user makes backup copy.	★★★	★★	★★	★★	A	★★★★
FORTRESS OF THE WITCH KING Avalon Hill Game Co. 4517 Hartford Rd. Baltimore, MD 21214 (301) 254-5300 $25 © 1983	Journey across fantasy landscape with a troop of adventurers, searching for your mighty foe, the Witch King. Many levels of play and 20 map boards, great for ages 10+.† —DELSON	Apple II/II plus/IIe, 48K (disk)	Defective disks replaced free; user makes backup copy.	★★★	★★★★	★★★	★★	A	★★★★
MICROSOFT DECATHLON IBM P.O. Box 1328 Boca Raton, FL 33432 (305) 241-7614 $29.95 (Apple) $35 (IBM) © 1983	Compete with up to six armchair athletes in races, hurdles, shot puts, discus and javelin throws, and pole vaults in exciting game for ages 8 and up.† —DELSON	IBM PC, 64K (disk); also available for Apple II/II plus/IIe, 48K (disk); IBM PC requires color card	Defective disks replaced free w/ in 90 days; user makes backup copy.	★★★★	★★★★	★★★	★★★	A	★★★★
M.U.L.E. Electronic Arts 255 Campus Dr. San Mateo, CA 94403 (415) 571-7171 $40 © 1983	Claim land, mine for intergalactic minerals, grow food and energy. Bid and bargain, trade and sell surplus in unusual economic game for ages 11 and up.† —DELSON	Atari 400/800/1200, 48K (disk); also available for Commodore 64 (disk); joystick required	Defective disks replaced free w/ in 90 days; backup copy available for $7.50.	★★★	★★★	★★	★★	A	★★★
RABBIT TRAIL Funware 230 E. Caribbean Dr. Sunnyvale, CA 94089 (408) 745-1655 $40 © 1983	Hop along bunny path, eating carrots, avoiding traps, weasels, hawks, and cars in surprisingly challenging game playable by all ages 6+. —DELSON	TI-99/4A (cartridge); joystick required	Defective material replaced free w/ in 90 days.	★★★	★★	★★	★★	A	★★
TITAN EMPIRE Muse Software 347 N. Charles St. Baltimore, MD 21201 (301) 659-7212 $34.95 © 1983	Criss-cross solar system, doing away with evildoers in game with complex play system. Provides tactical, strategic challenge best-suited for ages 13+.† —DELSON	Apple II/II plus/IIe, 48K (disk)	Defective material replaced free; $10 if user-damaged.	★★★	★★★	★★	★★	A	★★★
ZEPPELIN RESCUE Computer Software Assoc. The Silk Mill, 44 Oak St. Newton Upper Falls, MA 02164 (617) 527-7510 $19.95 (cassette) $24.95 (disk) © 1983	Maneuver clumsy blimp over city and rescue endangered citizens from tops of buildings, beneath bridges. Simple but compelling game requires nerves of steel and delicate touch. —DELSON	Commodore 64 (disk or cassette); joysticks required	Defective disks replaced free w/ in 90 days.	★★★	★★★	★★★	★★	A	★★★

RATINGS KEY **O** Overall performance; **D** Documentation; **EH** Error handling; **GQ** Graphics quality; **EU** Ease of use; **V** Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; n/a Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

SOFTWARE GUIDE

EDUCATION/FUN LEARNING

Title Manufacturer Price	Brief Description	Hardware/ Equipment Required	Backup Policy	Ratings O	D	EH	GQ	EU	V
DANCING FEATS Softsync 14 E. 34th St. New York, NY 10016 (212) 685-2080 $24.95 (cassette) $29.95 (disk) © 1983	Frustrated musicians and kids old enough to handle a joystick will enjoy making graphics and music in an unusual program that won't allow for a wrong note.† —AKER	Commodore 64 (disk or cassette); also available for Atari 400/800/1200, 16K (cassette), 32K (disk); joystick required	Defective material replaced free w/in 90 days.	★ ★ ★	★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★
EARLY GAMES FRACTION FACTORY Counterpoint Software 4005 W. 65th St., Suite 140 Minneapolis, MN 55435 (612) 926-7888 $29.95 © 1983	Seven-to-12-year-olds drill and practice fraction problems in five explicit, if occasionally dull, activities that provide a lot of friendly help.† —DICKSON	Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 16K (disk), 24K (cassette); IBM PC, 64K (disk); IBM requires color card	Defective material replaced free w/in 30 days; backup copy available for $5.	★ ★ ★	★	★ ★ ★	★ ★	E	★ ★
EARLY GAMES PIECE OF CAKE Counterpoint Software 4005 W. 65th St., Suite 140 Minneapolis, MN 55435 (612) 926-7888 $29.95 © 1983	Seven-to-12-year-olds learn basic math concepts in five games especially helpful to kids who need help catching on to the principals of addition, subtraction, multiplication, and division.† —DICKSON	Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 16K (disk), 24K (cassette); IBM PC, 64K (disk)	Defective material replaced free w/in 90 days; backup copy available for $5.	★ ★ ★	★	★ ★ ★	★ ★	E	★ ★
MOPTOWN HOTEL The Learning Company 545 Middlefield Rd., Suite 170 Menlo Park, CA 94025 (415) 328-5410 $39.95 © 1983	Ages 10–11 and over hone logical and reasoning skills (analogies, similarities, and differences) in series of activities starring the Bibbits and Gribbits of Moptown.† —MORRIS	Apple II/II plus/IIe, 48K (disk); also available for TRS-80 Model 4, 16K (disk); color TV or monitor required	Defective disks replaced free w/in 90 days; $10 fee if user-damaged.	★ ★ ★	★ ★ ★	★ ★ ★ ★	★ ★	A	★ ★ ★
MOPTOWN PARADE The Learning Company 545 Middlefield Rd., Suite 170 Menlo Park, CA 94025 (415) 328-5410 $39.95 © 1983	Ages 6–10 figure out what distinguishes different Bibbits and Gribbits. Trying to line them up in a parade or get them into an exclusive club are just two activities that help kids learn logic and reasoning skills.† —MORRIS	Apple II/II plus/IIe, 48K (disk); also available for TRS-80 Model 4, 16K (disk); color TV or monitor required	Defective disks replaced free w/in 90 days; $10 fee if user-damaged.	★ ★ ★	★ ★ ★	★ ★ ★ ★	★ ★	E	★ ★ ★
SAFETYLINE Maximus, Inc. 6723 Whittier Ave. McLean, VA 22101 (703) 734-4200 $29.95 (cassette) $34.95 (disk) © 1983	Kids ages 4–6 and up learn about safety tips, such as crossing at the corner, in two simple games. Also included is a computerized "movie" explaining street safety with the help of Max, the cat. —CHADWICK	Atari 400/800/1200, 48K (disk), 48K (cassette); cassette required for both formats	Defective material replaced free w/in 90 days; user makes backup copy.	★ ★	★ ★ ★ ★	★ ★ ★	★ ★ ★	E	★ ★
SPELLING BEE GAMES EduWare 28033 Dorothy Dr. Agoura, CA 91301 (213) 706-0661 $39.95 © 1982	Young students (recommended age: 5–10) learn early spelling and basic reading skills in series of four different games. —MORRIS	Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 48K (disk); Atari requires joystick	Defective disks replaced free w/in 30 days; $7 fee if user-damaged.	★ ★	★ ★	★ ★ ★ ★	★ ★	A	★ ★
STICKYBEAR NUMBERS Xerox Education Pub. Software Division 245 Long Hill Rd. Middletown, CT 06457 (203) 347-7251 $39.95 © 1983	Easy-to-use cleverly animated program for kids ages 3–6 helps teach number recognition and simple counting up to nine. —MORRIS	Apple II/II plus/IIe/III w/emulator, 48K (disk)	Defective disks replaced free w/in 90 days; backup copy available for $10.	★ ★	★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★
TIC TAC SHOW Computer Advanced Ideas 1442A Walnut St., Suite 341 Berkeley, CA 94709 (415) 526-9100 $39.95 © 1982	Kids select a subject area or make up their own and test each other in TV-type quiz show. —MORRIS	Apple II/II plus/IIe, 48K (disk); also available for IBM PC, 64K (disk); IBM requires color card	Defective disks replaced free w/in one year; backup disk available for free.	★ ★	★ ★	★ ★ ★	★ ★	A	★ ★

RATINGS KEY **O** Overall performance: **D** Documentation: **EH** Error handling: **GQ** Graphics quality: **EU** Ease of use: **V** Value for money: ★ Poor: ★★ Average: ★★★ Good: ★★★★ Excellent: n/a Not applicable: E Easy: A Average: D Difficult: † Longer review follows chart

WHAT'S IN STORE
SOFTWARE REVIEWS

On the following pages, you'll find in-depth reviews of some of the programs listed in the Software Guide. Refer back to the Guide on page 118 for information such as backup policies and addresses of software manufacturers.

HOME BUSINESS & HOME MANAGEMENT

Quick Brown Fox

HARDWARE REQUIREMENTS: Commodore 64 (cartridge); also available for Commodore VIC-20, 8K (cartridge or disk); datassette or disk drive required for storage of long texts
MANUFACTURER: Quick Brown Fox
PRICE: $70 (cartridge); $75 (disk)

A word processor is something you can live without—until you've used one for a while! *Quick Brown Fox* seems to have been geared to the office environment. (The fact glares from every page of the documentation.) Nevertheless, home applications—homework and correspondence, in particular, abound.

It may sound like a minor point, but the feature I like best about *QBF* is its cartridge format. That means instant on, no loading required, and makes it more likely to be used for short letters that might just as easily have been dashed off by hand.

It takes very little time to grow accustomed to *Quick Brown Fox*. The "#" key signals the printer that something special has to be done. "#P" starts a new paragraph. "#C" centers a line. When you make corrections, you transfer to the "edit" mode. Hitting "D" deletes the character under the cursor. "DW" erases a whole word, while "DS" and "DP" delete entire sentences and paragraphs.

A nine-year-old neighbor of mine watched me use *QBF* for a while, and finally asked if she could give it a try. With a few directions from me, she had no trouble typing in and changing sentences. This doesn't mean it's the best word-processing program for younger kids, but it could be a nice family package for households with teenagers.

There are a few limitations. You can't set tabs. It doesn't give word counts. (It just gives the number of characters for which room remains.) Also, it doesn't have what is known as "full-screen editing capability." In order to edit or make a change in your document, you have to go into a separate "mode" (which requires a separate series of commands).

Still, the logical organization of its commands, its coherent manual, and its convenient cartridge format outweigh *Quick Brown Fox*'s few drawbacks. —SHARON ZARDETTO AKER

Timewise

HARDWARE REQUIREMENTS: Atari 400/800/1200, 32K (disk)
MANUFACTURER: Atari
PRICE: $29.95

Do you forget birthdays? How about two different appointments with different people at the same time on the same day? Here's a program that may bring order to an otherwise discombobulated schedule.

Timewise's first screen asks you to select from a list of options. My first step was to enter appointments for several months in advance. For each appointment I added the date, time, person I was meeting (type initials), and the nature of the appointment (abbreviate here as well). Failure to enter all the information properly will result in a beep. The computer won't go any further until you enter the correct information.

The program includes a special feature known as a "wild card," which I found particularly convenient. With it, you can enter an event that regularly occurs each month—the paying of certain periodic bills, for instance. Birthdays can be entered for a stated date up to 10 years in advance. In addition, the feature allows you to enter a month and retrieve all dates scheduled for that particular month.

The computer will generate a neat monthly calendar, with stars next to the dates in which you've scheduled appointments. Type in the day's date and you'll get a list of all scheduled events.

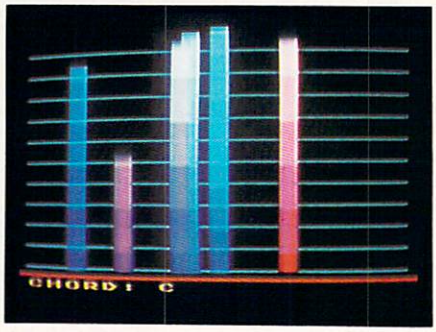
Timewise is extremely easy to learn and implement—thanks to painstakingly clear documentation, and prompts on the computer.

Using a computer to keep your schedule is a good idea, but you do have to accept a compromise in convenience. For instance, outside the office, how am I supposed to access my date book? After some months of using the program, I still use my little black book. I want to be able to look at an entire month at a time and see all appointments for each day. This is not to belittle the program, but merely to ask the question, "Can the computer do it better?" —ROBERT W. JACKSON

EDUCATION/ FUN LEARNING

Dancing Feats

HARDWARE REQUIREMENTS: Commodore 64 (disk or cassette); also available for Atari 400/800/1200, 16K (cassette), 32K (disk); joystick required
MANUFACTURER: Softsync
PRICE: $29.95 (disk); $24.95 (cassette)



Imagine a musical instrument that can't play a wrong note; that's what your computer becomes with *Dancing Feats*, a program that practically defies categorization.

Let's just call it fun. Choose a style of music (swing, rock, jazz, etc.) and the tempo you want. The computer will play the bass line while you play the lead with your joystick. Moving the stick in different directions creates different notes—every one of which will blend automatically with the chord that's being played by the bass. When the bass line changes, so do the notes you play.

Meanwhile, the screen displays a marvelous rainbow of colors. Every time you play a note, a thick vertical bar appears, which is divided into sections of different colors. As the note fades, the column slides downward until it disappears. The pitch of the note determines the left-right position of the color bar—so there are a lot of them on the screen at once, overlapping and sliding up and down. Believe me, words can't do it justice.

I don't know which my four-year-old enjoys more: the music or the colorful displays. What he likes best is the software's capacity to record his composition and have the computer play it right back. Older, perhaps more serious, "composers" will appreciate the fact that the piece can be saved on the disk, to be played again later.

Dancing Feats wasn't meant solely for children. I'm sure it will satisfy

programmer s

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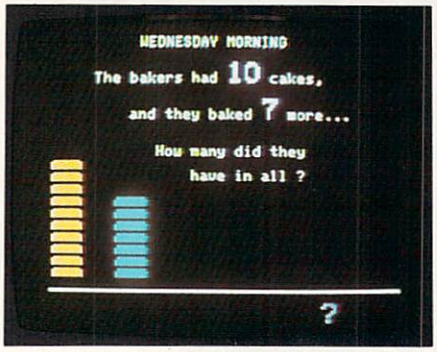
the frustrated musician in just about anyone. It won't teach you anything specific about musical notation or composition. But the combination of control over notes and insurance against discordant ones—delights not available on any other instrument—make for a warm and inviting introduction to the world of music. —SHARON ZARDETTO AKER

Early Games Piece of Cake and Early Games Fraction Factory

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 16K (disk), 24K (cassette); IBM PC, 64K (disk)
MANUFACTURER: Counterpoint Software
PRICE: $29.95 each

You're working in a bakery and a cake falls toward the floor. Quick, what is 9 + 3? Type the answer in time and you'll catch the cake; otherwise, it splats on the floor.

Counterpoint's new math program, *Piece of Cake*, is intended to teach basic addition, multiplication, and division skills. Together with a new fraction drill-and-practice program, *Fraction Factory*, it provides solid practice and instruction in the kinds of math skills with which most kids struggle.



True to the Counterpoint tradition, these packages are colorful and reasonably lively. Most of the games in *Piece of Cake*, and all of the games in *Fraction Factory*, furnish three levels of feedback for every given problem. The child who makes a mistake has at least two extra chances to answer correctly, helped a little each time with increasingly more explicit hints. In *Piece of Cake*, for instance, say your little girl is asked to figure out how many cakes the bakers have if they start out with nine and bake eight more. She answers incorrectly. The next screen would show the equation representing the problem: 9 + 8 = ?. Another incorrect answer and the program counts a stack of nine cakes next to a stack of eight cakes. If she still can't get it, a plus sign appears between the cakes and each number in the equation flashes. In this manner, the concept of addition is patiently, systematically outlined.

Fraction Factory contains one program that may cause confusion for some youngsters. From two to 100 objects are displayed in a grid-like configuration. A box is drawn around a portion of the objects (balls, trees, stars, etc.) and the learner must type the fraction of all the objects enclosed. Often a correct answer won't be accepted. In a collection of 56 balls, for instance, with 48 boxed in, the program would reject an answer of 48/56, accepting only the simplified answer, 6/7.

Colorful and fairly comprehensive as they are, both packages have a number of drawbacks that deserve attention. *Fraction Factory* and *Piece of Cake* together contain only one activity in which the player may select a skill level. The programs do not begin with easier problems and progress to more difficult ones. In the multiplication exercises, the child may have to begin by multiplying 86 by 81! Also with both games, sound and graphics rewards for correct answers consume a disproportionate amount of the learner's time. Children may answer a problem within a few seconds after it appears, but the 10 or so seconds worth of tunes and pretty shapes that follow allow them to answer no more than four or five problems a minute.

Nevertheless, both disks contain some worthwhile material: *Piece of Cake* furnishes problems that will help kids improve their speed and accuracy in solving basic math problems, and *Fraction Factory* will help with those troublesome halves, thirds, fourths, and sixths. Even in an age of computers and hand-held calculators, kids need practice in these areas. —W. PATRICK DICKSON

Moptown Hotel and Moptown Parade

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk); also available for TRS-80 Color Computer, 16K (disk); color monitor or TV required
MANUFACTURER: The Learning Company
PRICE: $39.95 each

"Bibbits have beaks and Gribbits have tails." Or so my youngest child informed me when I first sat down to try *Moptown Parade*. I don't remember this gem of wisdom from my Logic 101 course, but it turns out that this simple rule is an important first step in learning fundamental logic and reasoning skills taught on both *Moptown Parade* and *Moptown Hotel*. Moptown is inhabited by (who else?) moppets. Some are red and others are blue; some are fat and others are thin; some are tall and some are short. And, you guessed it, some are Bibbits and some are Gribbits.

For the young (recommended age level: six–10) or uninitiated, *Moptown Parade* is the easier of the two programs. In the simplest activity, you are shown one moppet—a tall, fat, red Gribbit, for instance—and asked to make its twin by selecting matching characteristics. Another game presents four moppets, one of which differs from the rest in some way. Your task is to figure out which moppet is different and why. Games become progressively more challenging through to the final two games.

Kids who've cracked the clubhouse rules, or older kids, 10–11 and up, may graduate to another package, *Moptown Hotel*. The simplest game in the package is "Who's Next Door?" which teaches the concept of analogies. Next-door neighbors may differ from one another in only one way: a tall, thin, red Bibbit can live next door to a tall, fat, red Bibbit, for example, but not a short, fat, blue Gribbit. Residents on the floor directly below must be placed in the same pattern. It's a no-nonsense game that nine-to-10-year-olds will find truly challenging. These puzzles may trip up the old folks, too. It really does as it claims—it teaches analogical thinking the remaining six games increase in difficulty and teach other logic skills.

The six-to-10-year-olds, for whom

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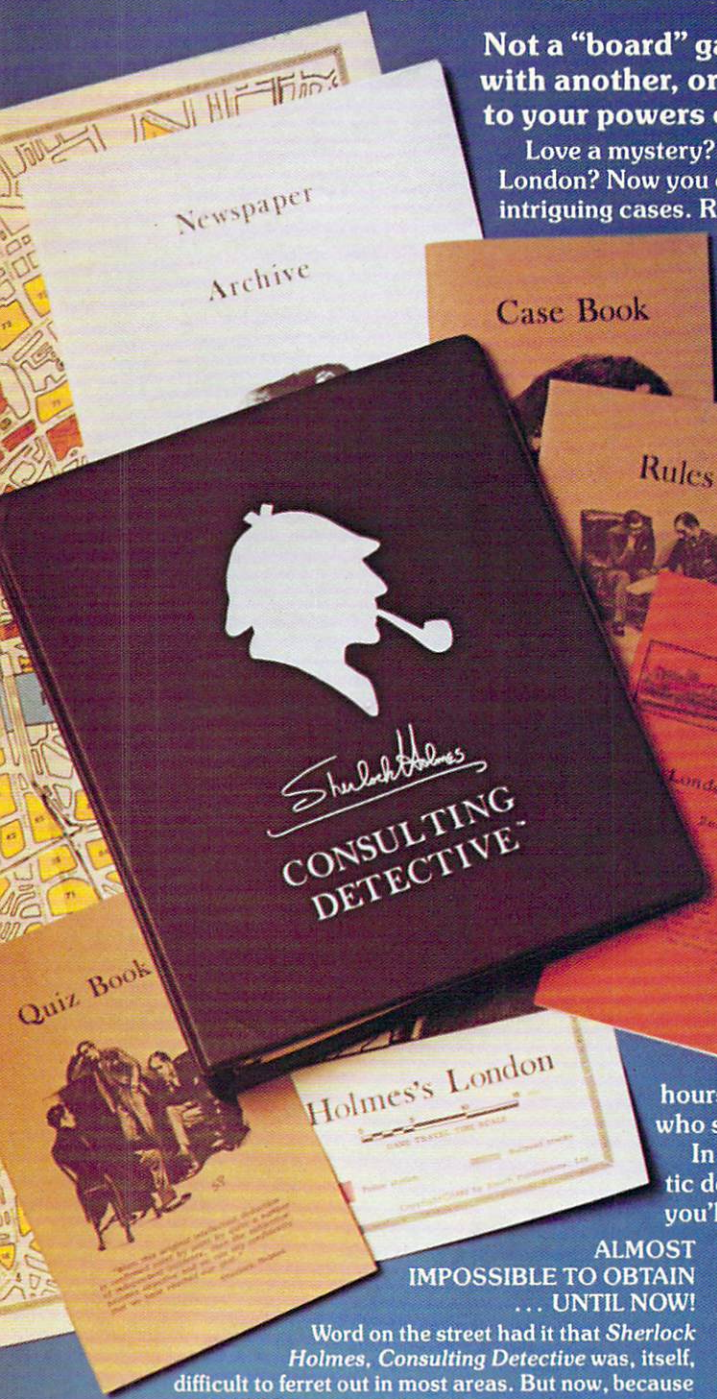

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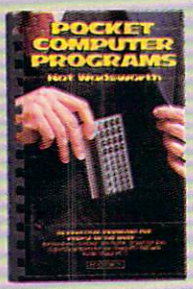

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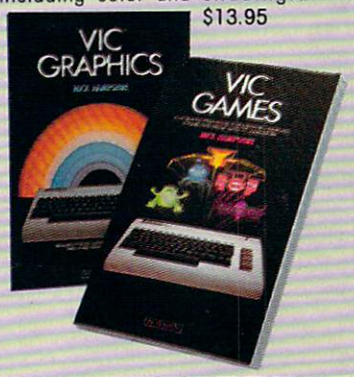

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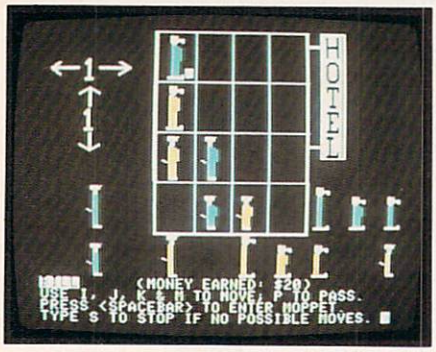
Moptown Parade is intended, will definitely require adult assistance with the game. One youngster pointed out that "kids won't know what a trait means." Older visitors to *Moptown Hotel* liked the variety of games available. They enjoyed the different levels of skill and the clear manual. They also appreciated the fact that they could turn off the sound and easily exit. In general, the *Moptown* programs require a lot of patience. Older children may get bored, the challenge notwithstanding. Bright, highly motivated kids will benefit and delight from their *Moptown* sojourn. Also, for the



$39.95 price, I would like to have seen more sophisticated graphics, and maybe an option that allows for timed or cumulative scoring.

—TONY MORRIS

GAMES

Broadsides

HARDWARE REQUIREMENTS: Apple II/II plus/IIe/III w/emulator, 48K (disk)
MANUFACTURER: Strategic Simulations
PRICE: $39.95

Imagine yourself commanding an 18th-century warship, sailing into combat against enemy vessels. Fire your cannon to disable them at a distance. Maneuver alongside and board their decks. Watch your animated swordsmen battle it out with the opposition. Direct your crow's nest snipers to pick off the enemy's crew. Select a ship from the 10 stored on the game disk, "build" one based on the 55 vessels detailed in the excellent instruction manual, or design your own to suit your vision of the way things could have been.

Offering simple arcade action, more complex boarding scenarios, or highly sophisticated tactical encounters, this superb program is exciting to play, difficult to master, and indicative of the direction that high-quality game design is heading. Its

importance stems from its conceptualization and delivery of a realistic historical simulation. Like other Strategic Simulations games I've talked of in these pages (*Road to Gettysburg, Knights of the Desert, President Elect*), its accuracy and its engrossing quality combine to make it downright educational.

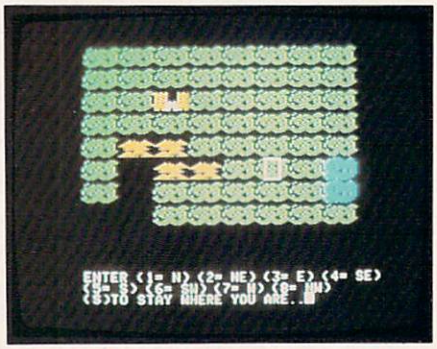
Play testers ages eight and up enjoyed the simple arcade aspects of the game; those over 12 were able to understand and control the ships in more complex tactical scenarios. Some players, however, said the intricate movement patterns, based on careful observation of existing wind speed and direction, were too much to handle, and turned thumbs-down on *Broadsides*. They felt the game was too much trouble for the limited arcade action it offered. Buyers should bear in mind the tactical nature of the game when purchasing it. It's best suited for players who want more than just a shoot-'em-up.

—JAMES DELSON

Fortress of the Witch King

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk)
MANUFACTURER: Avalon Hill
PRICE: $25

Those of you who don't have the patience or interest to play more in-



volved adventure games, but still want more excitement than that found in the simplest adventures, will find this scenario both challenging and enjoyable. Command a troop of warriors, clerics, scouts, and raiders, transporting your gold on mule-back and supplementing your team with dwarfs, elves, and wizards on a journey across a medieval/fantasy landscape. You'll take on the lowly goblin or more powerful gorgon and hacker. Victory will bring you gold and magic items such as dragon-slaying swords, magic maps, and spells to help you in your search for the Witch King, your greatest foe.

Even though battles are fought by the computer, with you simply supplying a YES or NO to the question of whether you want to continue fighting, this isn't to say that experienced players won't enjoy *Fortress of the Witch King*. Like all well-designed games, it can be played on a variety of levels. You can employ strategic skills as you explore the large map board, acquiring wealth and building your small party into an army as you seek out the magic items you will require to break into the Witch King's castle.

Kids will love the easier levels of play—from one-to-four starting set-ups are available, as well as 20 increasingly difficult map-board layouts. As they improve their skills they can develop more strategic approaches. Suitable for one-to-four players ages 10 and up, it may lack some of the subtlety to be found in other adventure games, but who cares, when the fun is so immediate? Also to its credit is the fact that it can be played in a reasonably short period of time—unusual for many adventures and war games.

—JAMES DELSON

M.U.L.E.

HARDWARE REQUIREMENTS: Atari 400/800/1200, 48K (disk); also available for Commodore 64 (disk)
MANUFACTURER: Electronic Arts
PRICE: $40

There's Smithore in them thar hills! Smithore is an intergalactic mineral. And miners with gumption, initiative, and daring will stake their claim on distant worlds to strike it rich. Mining not in your future? Then try growing crops or producing energy to maintain the other miners who are struggling to make it alongside you. Enlist the aid of a M.U.L.E., a robot-like hauling machine complete with animal instincts, to help in your headlong

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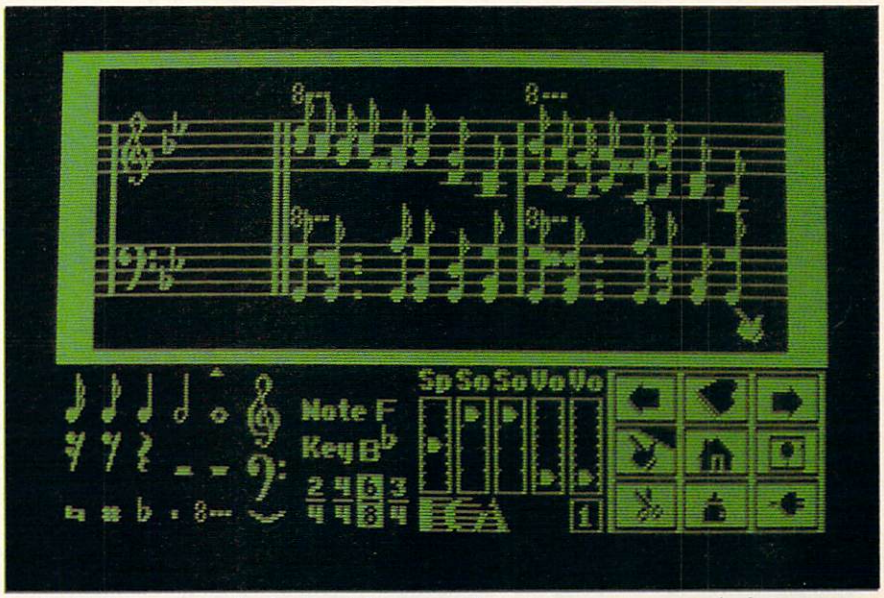

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Take a good look at this screen because it, you, and a joystick are the whole story here.

That's you at the right end of the staff of notes — the little hand. Move the joystick, and you move the hand. Use it to carry notes up to the staff. Lay in rests, signatures, clefs, then point to the little piano in the lower right and listen, because you'll hear the whole thing played back.

Move those little scales in the middle up and down to vary the music's speed, sound quality, and volume. Use the scissors to cut out whole measures, then use the glue pot to paste them in somewhere else. Got a printer? Great. Print the score out and show it off to your friends.

But what if you're not up to writing your own stuff yet? No problem. There are twelve pieces of music already in here, from rock 'n roll to baroque. They're fun to listen to, and even more fun to change. (Apologies to Mozart.)

The point is, the possibilities are endless. But if you're still skeptical, visit your nearest Electronic Arts dealer and do the one thing guaranteed to send you home with a Music Construction Set in tow.

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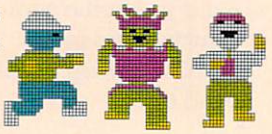

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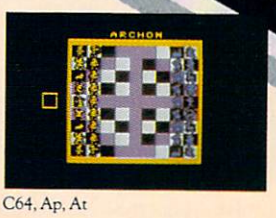

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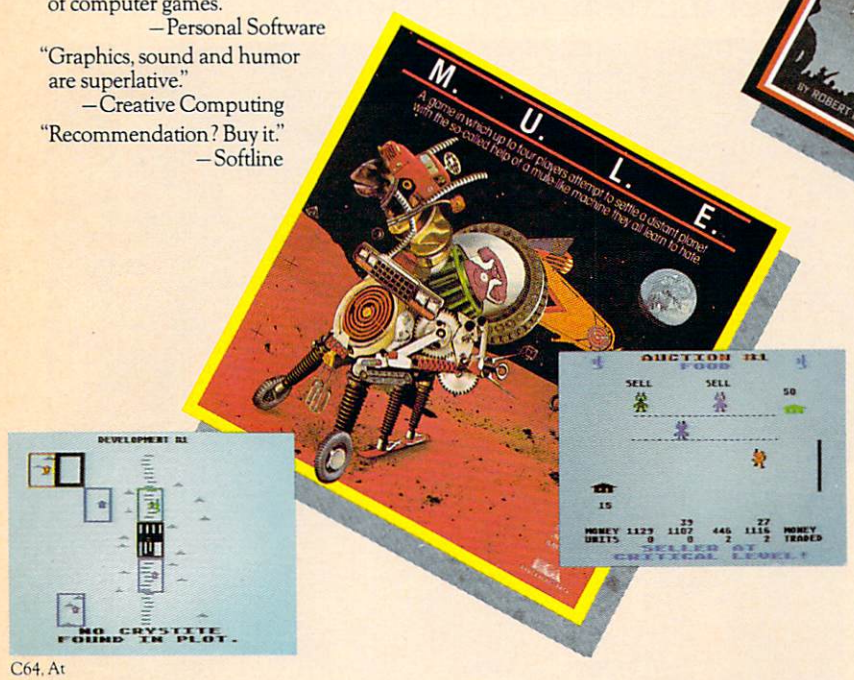

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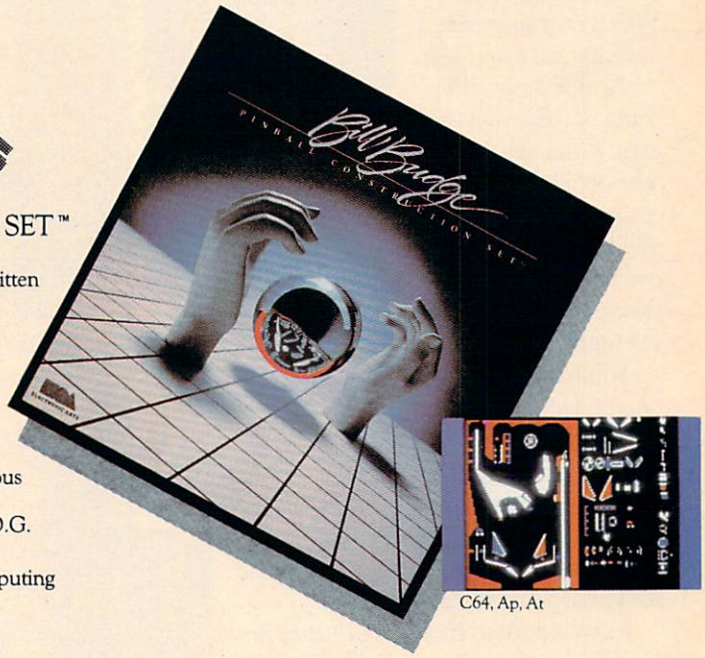

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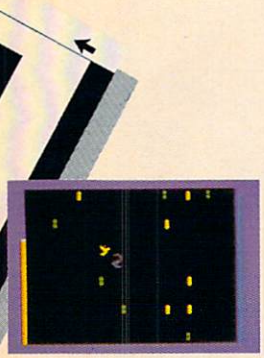

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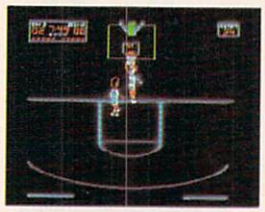
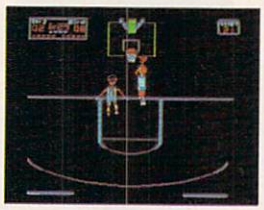
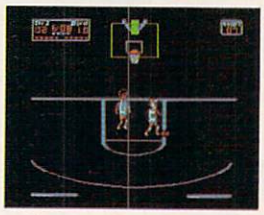
We talked to them, photographed them in action, studied their moves and their stats and their styles. Then we set out to create on computer disc an event which may never happen in real life. We put the two of them together on a dream court of light, for an electronic afternoon of one-on-one.





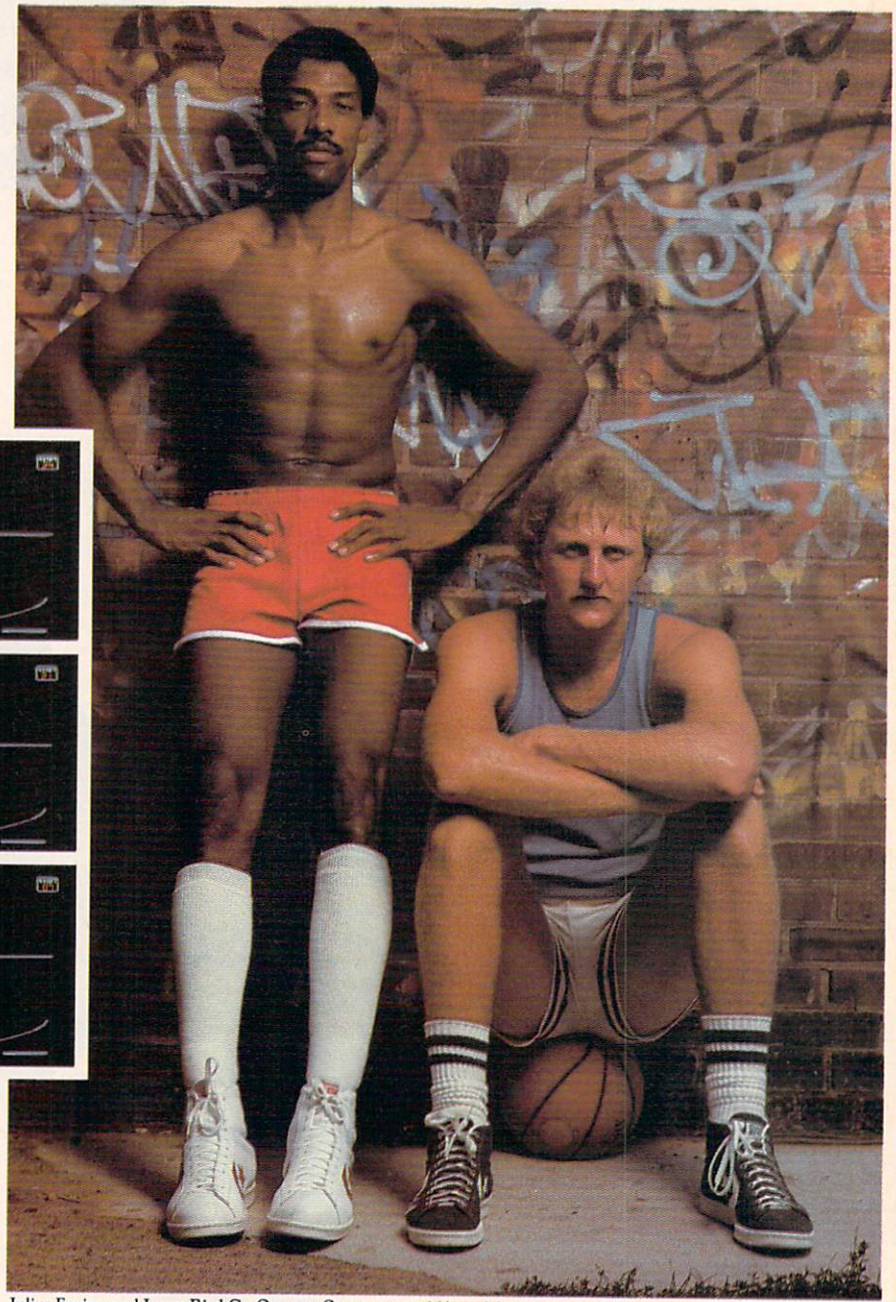


It wasn't easy. When they talked, we listened. When they criticized, we made big changes. When they gave suggestions, we took them.

And it shows. This thing is absolutely uncanny. You actually take on all the skills and characteristics of Bird or The Doctor – their own particular moves, shooting abilities, even strength and speed.

You'll meet with fatigue factors, hot and cold streaks, turnaround jump shots, and 360-degree slam dunks. But there's some whimsy in here, too – a funny referee, a shattering backboard, even instant replay.

It's called *Julius Erving and Larry Bird Go One-on-One.*™ You're Bird. Or you're The Doctor. And that's the last decision you'll have plenty of time to make.



Julius Erving and Larry Bird Go One-on-One is now available on diskette for Apple II, II+, and IIe computers. Apple is a registered trademark of Apple Computer. To find out more about Electronic Arts and its products, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171.

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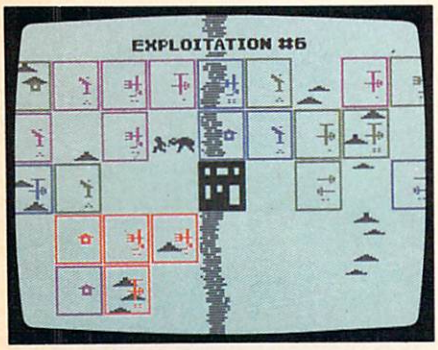
rush for riches.

The computer will keep track of your supplies and furnish an opponent for solo play. From one-to-four players can dig for Smithore, grow food or energy, or, in the tournament version (the third of three in-



creasingly difficult levels of play), dig for another kind of ore, called Crystite. Each turn ends with an auction at which you sell your wares to the highest bidder, then buy what you think you'll need for the next round. Other elements of the game include an arcade-like "land rush"—à la Old West—periodic forays to search for the elusive wampus (a local cave creature), and occasional trips to the local pub (a relatively harmless detail, but one that parents should know about).The game's basically an economic one—you keep track of resources and products. The more methodical your approach, the better off you are.

Players ages eight and up were able to enjoy the basic game, but as play became more complex, the age level required to fully comprehend it rose as well. The standard game was suitable for ages 11 and up and the tournament game for precocious 12-year-olds or novice 14-year-olds.

—JAMES DELSON

Microsoft Decathlon

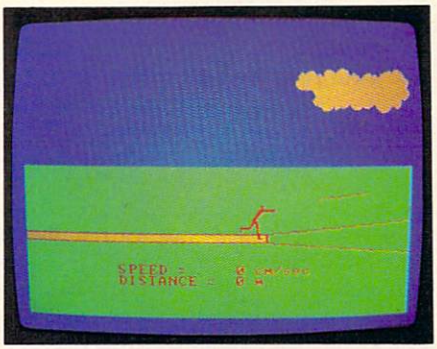
HARDWARE REQUIREMENTS: IBM PC, 64K (disk), also available for Apple II/II plus/IIe, 48K (disk)
MANUFACTURER: IBM
PRICE: $35

With the Olympics just a few months away, armchair athletes across the country can now get their chance to train for the most grueling of all competitions, the Decathlon. Using cleverly coordinated keyboard controls, you "run" the 100-, 400-, and 1500-meter races; "leap" the long and high jumps; "throw" the shot put, discus, and javelin; "skim" the 110-meter hurdles; and "hurdle" the pole vault. Up to six players may compete against each other, the standing records set by Bruce Jenner in the 1976 Olympics, and an unnamed Swedish athlete who won the first title in 1912.

Terrific hand-eye-coordination skills aren't required for every event in the challenging program, but without a good deal of patience you'll never learn to master the more difficult activities. The easiest events are the 100- and 400-meter dashes, which call for you to alternately hit the "1" and "2" keys at high speed to move the feet of your player. Along with the shot put, you can learn these events immediately.

More practice and patience are required to master the combination of running and throwing or jumping skills necessary in such medium-level events as the javelin throw, 110-meter hurdle, and long and high jumps. The high-level events are all so difficult that they could be considered mini-games on their own.

The pole vault, for instance, put me to shame. My eight-year-old nephew, Billy, did it. The neighborhood teenagers mastered it. Even some adults I know could make it over the top. But I still haven't achieved one successful vault, though I've spent hours trying. Using a variety of different keys you must successfully run, place your pole, launch, and push yourself over the bar. Without a doubt, this is the single toughest hand-eye feat I've encountered in gaming.



Maybe it's the challenge of actually learning to do all of these feats that excites me so much, or seeing adults and children from eight to 60 playing alongside one another on equal footing. Whatever the reason, *Decathlon* is an excellent program.

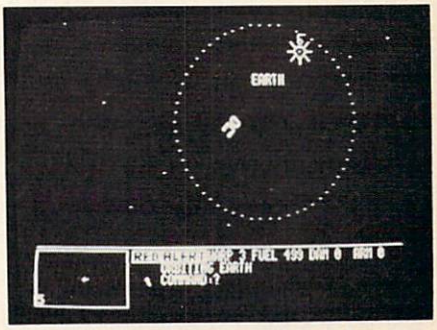
—JAMES DELSON

Titan Empire

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk)
MANUFACTURER: Muse Software
PRICE: $34.95

If you haven't experienced the responsibility of trying to rid our solar system of evildoers, this is your golden opportunity. *Titan Empire* is an exciting program that offers warp-speed interstellar travel and space combat against as many as eight enemy vessels at one time.

Winning requires that you carefully plan your campaign. If all you want to do is blast a few dozen ships, fly around and refuel, and fight a few land battles, that's all right, too. This flexible game system can be played by anyone over the age of 10, though it will take more serious dedication and much practice to



master the difficult levels of the program. Thus, *Titan Empire* is as challenging for experienced players as it is for newcomers. Don't plan on saving the solar system the first time out; those aliens are tough fighters and their movements are difficult to track.

Combat is complex. In addition to straightforward missile fire, you have the option of either firing at the ship nearest yours, or another enemy aircraft. You can fire photon torpedoes, which behave like outer space mines, drifting rather than speeding towards the enemy. Young play testers found the arcade shooting moderately interesting, but lost patience with having to fly around the solar system in search of targets. The game was much better suited to players over 13 who were able to grasp the concept of a huge battlefield that must be traversed constantly in order keep out the enemy. The graphics are outmoded, recalling old-fashioned *Asteroids* or *Space War* arcade machines, but the playability of this exciting program more than makes up for that shortcoming.

—JAMES DELSON

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WHAT'S IN STORE
BOOK REVIEWS

The Essential Guide to Timex/Sinclair Home Computers

Peter Morse, Ian Adamson, Ben Anrep, and Brian Hancock
Simon and Schuster, 1983
526 pp., softcover, $8.95

Who knows how many books have been written about the ZX 81 and its counterpart, the TS 1000? I've purchased my share and have found many lacking, in spite of their lofty claims to tell all. By no means am I an expert, but my stubborn determination to learn combined with my extensive library certainly qualify me to handle most of the programming problems I may encounter.

Of course, balloons do burst. Just when I think I "know it all," along comes a book that shows I've still got a lot to learn. The *Essential Guide* is the most complete book I've seen yet. Formatted like a textbook, the guide ushers the first-time user into the world of computers in an easy, organized manner, starting out with a systematic description of the Timex components and continuing through an introduction to BASIC and the fundamental operations of the computer.

The *Essential Guide* contains explicit instructions for converting programming commands for use on Timex's more recent TS 2068. It features a section devoted exclusively to the new machine. This fat guide's an exceptional value, guaranteed to spend more time next to the computer than on the shelf above it.

—JAMES ROBERTS

DON'T! (or How to Care for Your Computer)

Rodnay Zaks
SYBEX, 1981
203 pp., softcover, $14.95

If you don't have the time or money to spend the next year or two making expensive mistakes and learning from the experience as you accustom yourself to your new computer, do take a look at *DON'T*.

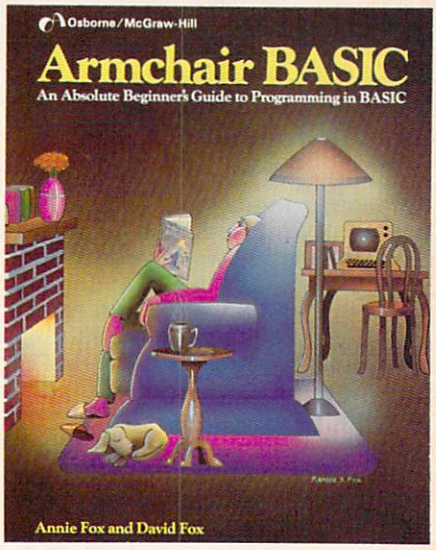
The author painlessly remedies the human carelessness and lack of knowledge responsible for so many machine failures with a heavy dosage of hypothetical catastrophes—grizzly enough to make your skin crawl. Many of these computer fiasco scenarios focus on small business and industry computers. But the home computer user will be able to cull relevant home-scale information from the examples given.

Chock full of tips on averting computer catastrophe, *DON'T* is a helpful human troubleshooter. When it comes to learning one's lesson about proper computer care, experience may be the best teacher. Rodnay Zaks, however, is a less annoying, and significantly less expensive, substitute.

—ROBIN RASKIN

Armchair BASIC: An Absolute Beginner's Guide

Annie Fox and David Fox
Osborne/McGraw Hill, 1983
264 pp., softcover, $11.95



If you still associate REM statements with "rapid eye movements," and floppy disks with back problems, then *Armchair BASIC* is for you. As co-founders of the country's first center (in Marin County, California) in which the average street person could get a feel for the computer for a nominal hourly fee, the Foxes are familiar with the woes of the computer-anxious. Their style is geared to captivating even the most angst-ridden reader.

Introductory BASIC books can be a nightmare for arithmaphobics. Examples of random-number generators and probability problems are enough to make many throw in the towel. *Armchair BASIC*, on the other hand, begins its chapter on the commands PRINT, LIST, RUN, and NEW with an example in which you must enter, store, and recall a recipe for Eggplant Parmesan Deluxe. Now you're cookin'! The Foxes furnish examples of simple BASIC programming, substituting words for many numbers. The concept of variables is easier to swallow when illustrated by examples such as ice cream flavors

instead of plain numbers.

Fun and learning continue as you copy simple programs to pick your lucky number, adjust centigrade temperatures to the more common Fahrenheit measurements, and search through computerized phone directories.

Whether you're at the doctor's office, curled up in your favorite armchair, or seated in the glow of your family monitor, *Armchair BASIC* provides a deliciously sugar-coated, yet substantial taste of the preliminaries of programming. —ROBIN RASKIN

A Parent's Guide to Personal Computers and Software
The Editors of Consumer Guide, with Danny Goodman
Simon and Schuster, 1983
64 pp., softcover, $6.95

The compulsion to get the family into computing is natural. We're all flooded with messages from the media about the importance of being up-to-date in the information age. As many families quickly discover, however, really being up-to-date involves a lot more than the mere decision to get a computer. With new models announced monthly and old models falling away just as rapidly, the confusion we face is understandable. *A Parent's Guide to Personal Computers and Software* will come in handy as a valuable, painless tool for answering such questions as "How can our family use a computer?" and "How can we choose good educational software?"

Unfortunately, the book's value is limited by the same factors that throw us all into such confusion about computer purchases in the first place. The meat of it is devoted to explaining the 12 major brands of personal computers available at its date of publication. This section is composed of profiles, each consisting of photographs, charts outlining basic features, and a summary—"Is the (Timex Sinclair 1000, or whatever the case may be) for you?"—including the particular brand's pros and cons. Much of this hardware info is slightly out-of-date. The Atari 400, for instance, is discontinued, and most of us know about the fate of the TI-99/4A.

So when you prepare for your forthcoming purchases, be sure to curl up with the latest copy of a reliable computing magazine as well. No one said that defying obsolescence would be easy! —C. PRISTEN BIRD

Now NRI takes you inside the new TRS-80 Model 4 microcomputer with disk drive to train you at home as the new breed of computer specialist!

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THE PRIMER

The Primer will appear in every issue of FAMILY COMPUTING. You might look to it for "Everything You Always Wanted to Know About Computers but Were Afraid to Ask." New information will be presented periodically, and existing sections will continually be adapted and updated. Whatever the format, the Primer is a handy reference guide to shopping for, setting up, and using a computer.

The only way to learn to use a computer is to use one. But before you start, it's well worth asking, "What can I do with a computer?" And, "How does a computer work?"

The illustration of a computer system on the opposite page shows various pieces of equipment, referred to as hardware. To work effectively, this hardware needs step-by-step instructions, or programs. These programs are often called software. What you can do with a computer depends on the software you use.

The many uses of home computers can be broken down into several broad categories.

WHAT A COMPUTER DOES

Game Playing. Several types of games are available—arcade-style action, fantasy, adventure. Some take minutes to master; others months. Many games can be played by more than one person at a time.

Education. Whether you are learning math, French, history, or typing, these programs allow you to learn at your own pace. Programs range from question-and-answer drills to loose creative exercises. Some test logical skills, by putting you in a real-life problem-solving situation; others teach you to program by letting you draw pictures.

Paper work. When it comes to handling reams of information, the computer can't be beat. It functions as an endless supply of paper, file cabinets, and a calculator rolled into one. With an electronic spreadsheet, you can change one figure in a budget and the rest will automatically change. The ability to ask "what if?" and see immediate results has obvious time-saving benefits.

The computer is equally adept at setting up a filing system, and allows you to cross-reference data in any number of ways for easy recall.

With a word-processing program, the computer can speed up and simplify the writing process, by allowing you to change or rearrange words and paragraphs without retyping.

Information access. You can hook your home computer, via the telephone, to much larger computers at "information service" companies. This allows you to "call up" stock quotations, airline schedules, newspaper and magazine bibliographies, encyclopedias, and even games.

Also, by using the telephone lines you can hook your computer to other home computers around the country, and leave or receive messages. This practice is known as electronic mail. Several computers linked together are called a network.

Programming. It's possible to enjoy practical benefits from your computer without ever buying a commercial program—you can write your own. And, in some cases, you can adapt commercial programs to better suit your particular needs.

HOW A COMPUTER WORKS

The computer is an information-handling machine. It stores, compares, changes, and manipulates information of almost any kind at tremendously high speeds.

The computer's operating method can be boiled down to four simple steps. (1) INPUT: Instructions and information, in the form of a program and data, are entered into the computer. (2) PROCESSING: The computer executes the steps of the program. (3) OUTPUT: The results of the computer's work are made visible and available to the user. (4) STORAGE: Results can be stored and saved.

Most home computers do not come ready-made in one piece, but must be assembled from various components. Following are the components needed for each of the four operating steps, and how they work.

Input. There are four basic ways of getting a program and/or other information into a home computer.

KEYBOARD. The keyboard looks and behaves much like that of a typewriter. Some keyboards have special keys for certain computer functions, and some have a numeric keypad, much like a calculator. But on any unit, every keystroke you type goes directly into the computer's memory. That information will stay there until you delete it or turn the computer off. (You can also store, or save, that information for future use.)

CASSETTE TAPE RECORDER. You can copy a program stored on a cassette tape directly into the computer's memory. Regular tape recorders and cassettes can be used with most home computers, although you will need a special cable to connect the two. Once connected, you merely type a simple command to transfer the program from tape to computer.

DISK DRIVE. The transfer method is much the same with a disk drive, except that the program is stored on a floppy disk, which looks much like a 45 rpm record.

The disk drive enters programs much more quickly and with less chance of error than the cassette recorder. But the cassette recorder is significantly cheaper.

CARTRIDGE. A cartridge, which plugs into a slot built into some computers, also stores programs. Putting a cartridge into a computer actually adds memory to the computer—and that memory contains a program.

Processing. All input goes to the Central Processing Unit (CPU), located underneath the keyboard. The CPU is a maze of tiny electronic circuits, but it functions as a giant.

The CPU controls the flow of information into, out of, and inside the computer. The computer's memory, where information is stored, is located in the CPU. The CPU also interprets a program, performs each of its steps, and then sends the results to the user.

Output. The visible result of a CPU's work is called output. Output is made available on the screen of a

THE COMPONENTS

TV or monitor, or from a printer.

Computers can be hooked to TVs or monitors, and to printers. In all cases special cables are required. In general, the monitor's screen display is sharper than the TV's.

Storage. When the computer is turned on, it will store and remember all information it receives. But when it is turned off, this information will vanish—unless you instruct the computer to save it.

You can store information on a blank tape or disk. Either way, you can record the results of the computer's work, just as you would record a speech. Then, any time you want to run that program again, you can transfer it into the computer's memory, and see it on the display screen.

You cannot store new information on a cartridge.

Peripherals. Peripherals are optional pieces of equipment that can be added to your computer, but are not crucial to the computer's operation. A printer, in fact, is considered a peripheral. One of the most popular peripherals is a modem.

MODEM. If you want to link your computer to an information service or other computers, you will need a modem. A modem holds a telephone receiver and transmits and receives data through phone lines.

Remember that the computer is a tool. As with all tools and machines, there is no need to know everything about how a computer works. All you need to know is how to use it for your own purposes.

ILLUSTRATIONS BY ROBERT TIMPERIO

THE PRIMER
THE WORDS

to store any information. The word "initialize" is often used to mean the same thing as format.

Function key
A special key on the computer's *keyboard* that has been or can be designated to perform a specific task.

Graphics
Pictorial displays on the *CRT*, such as charts, graphs, and symbols. Contrasted with *text*.

Graphics tablet
A kind of electronic drawing board. With a graphics tablet and a special pen, whatever you draw will appear simultaneously on the *CRT*.

Hard copy
Information printed by the computer onto paper.

Hardware
The physical, nonchanging parts of a computer system. Contrasted with *software*, or *programs*, which can change.

High-level language
A *programming language* that resembles an ordinary spoken language (e.g., English). *BASIC* is a high-level language.

Input
Programs or *data* entered into the computer.

Interface
An electronic connector between the computer and its *peripherals*.

K
Abbreviation for kilo, or 1,000. When used to describe the amount of *memory*, or storage space, a computer has, it often signifies 1,024. A computer with 16K *bytes* of *memory*, for example, can store 16,384 *characters* of information.

Keyboard
Designed much like that of a standard typewriter, the keyboard is used to enter information into the computer.

Load
To enter a *program* from an external storage device into the computer.

Information services
Broad-based *data bases* that offer a variety of services, ranging from airline reservation information to stock market quotations. You need a *modem* to link up with such a service.

LOGO
A *programming language* that allows the user to draw pictures on the screen. LOGO is particularly good for teaching young children how to *program*.

Loop
A statement in a *program* that instructs the computer to repeat a certain task.

Machine language
A binary code consisting of "0s" and "1s," which is the only language a computer understands. *Programs* written in any other language, such as *BASIC*, are translated into machine language for processing.

Membrane
A type of computer *keyboard* with a flat, smooth surface.

Memory
The place in a computer where *data* and *programs* are stored.

Menu
A list on a *CRT* of the operational options of a computer *program*; a list of programs stored on a tape or *disk*.

Microcomputer
A small computer designed primarily for home or small business use. The micro can do today what many room-sized mainframe computers did 20 years ago.

Microprocessor
A tiny processor on a single *chip*. The "brains" of all *microcomputers*, it is also found in many consumer and industrial products.

Modem
A contraction of Modulator/Demodulator. A device that makes it possible to transmit and receive computer *data* over telephone lines.

Monitor
A device for visually displaying a computer *program* or the results of that program on a screen. See *CRT*.

Network
A system of linking computers so that users can share resources and exchange information.

Operating system
A *program* that controls the operation of a computer system, such as controlling signals to the *disk drive* or *printer*. When a computer system is turned on, the operating system is the first program executed. All subsequent programs are loaded and supervised by the operating system.

Output
Computer-generated information that is transferred to a *monitor*, *disk*, tape, or *printer*.

PASCAL
A *programming language* that can be used on many *microcomputers*. While it is considered more difficult to learn than *BASIC*, it can generate *programs* that run faster and use less *memory*.

Peripherals
Hardware accessories for a computer, such as a *disk drive*, *printer*, or *modem*.

Pixel
Stands for "picture element." A single dot of light on a TV screen or computer monitor. These tiny elements are used to create electronic pictures, or *graphics*.

Plotter
A machine, attached to a computer, that prints lines or graphs on paper.

Printer
A machine that transfers information stored in the computer onto paper. Two of the most commonly used printers are: dot matrix—a printer that forms *text* or *graphics* using a group of individual points (dots); and letter quality—a printer that prints fully formed characters (like a typewriter), using a type element called a "daisy wheel."

Program
A set of step-by-step instructions that tells a computer how to solve a given problem. Also, to prepare such a set of instructions.

Programming language
A language, with clearly defined rules, that can be used to express a computer *program*.

RAM
Random Access Memory. An area in the computer where information is stored. When called into this area, information can be *read*, changed, or edited. However, it will be lost when the computer's power is turned off, unless you first *save* the information.

Read
The process of copying information from a storage device (such as floppy *disk* or tape) into the computer's *memory*. Reading only copies; it does not erase the *data* from where it is stored.

Resolution
The sharpness of a picture on a *CRT*, usually described as "high" or "low." The higher the resolution, the sharper the picture. Resolution is expressed by the number of *pixels* in the display. For example, 560x720 is much sharper than 275x400.

ROM
Read Only Memory. Permanent *memory* built into a computer by a manufacturer. The information stored here gives the computer operating instructions when it is first turned on. The user cannot change this memory, but "only read" it.

Save
To store information from *memory* on tape or *disk* so that it can be used again.

Software
Computer *programs*. Also, tapes and *disks*.

Stringy floppy
A computer storage device that holds a magnetic tape, called a wafer. The enclosed wafer tape is thinner, narrower, and faster than conventional cassette tapes.

Terminal
A computer user's workstation. Also refers to the computer screen where information is displayed.

Text
Words, letters, and numbers that appear on a *CRT*. Contrasted with *graphics*, which are lines, shapes, and symbols.

Winchester
A type of hard disk that is sealed in an air-tight, dust-free container. See *disk*.

Word processor
A *program* that allows the user to write, edit, or rewrite *text*. The *text* can be saved on a storage device and printed out. A word processor allows the user to make changes in the same *text* without retyping the whole page.

Write
The opposite of *read*. To transfer information from the computer's *memory* to a storage device such as a floppy *disk*. Write-protect is a procedure for preventing a disk from being written to.

THE PRIMER
THE WORDS

The Words is a glossary of commonly used computer terms. Some are well-known English words, such as *read* and *write*, that have been incorporated into computer language and given different meanings. (Note: All italicized words in the definitions are defined in full elsewhere in the glossary.) Other terms that refer to a computer's inner workings are not often used in common speech, but are important because they are used in manufacturers' specifications and ads. Don't be awed by them. Remember the delight with which Americans took to the new NASA language over 20 years ago, when John Glenn first orbited the globe.

Access
To retrieve information from a storage place in the computer system. Access time is the amount of time it takes to obtain the information.

Address
A specific location in the computer's *memory* where a piece of information is stored. Each address is identified by a number.

Applications software
Programs that instruct the computer to perform one task or a group of related tasks, such as keeping track of a household budget, or the accounting and inventory of a business.

BASIC
Beginner's All-purpose Symbolic Instruction Code. A popular, easy-to-learn *programming language* widely used with *microcomputers*.

Baud
Bits per second. A unit of measurement that describes the rate at which *data* are transmitted from one device to another, such as computer to *printer*, computer to computer, or computer to *terminal*.

Binary code
A number system using only two digits, "0" and "1." Any number or letter can be expressed as a combination of these digits. Computers use the system by translating each *character* of information into a string of binary numbers.

Bit
The smallest unit of information a computer uses. A bit is either the digit "0" or "1." An "eight bit" processor manipulates *data* in clusters of eight bits.

Board
Printed circuit board. A flat, thin rectangular component of a computer that includes one or more layers of printed circuitry and to which *chips* and other electronic parts are attached. As an add-on to an existing computer, sometimes called a card.

Boot
Derived from "bootstrap." To start or restart a computer system by *reading* instructions from a storage device into the computer's *memory*.

Bug
An error in the logic of a computer *program* that prevents it from running properly. Bugs can cause a program to "freeze up," that is, to repeat the same operation endlessly. Finding and correcting the error is called debugging.

Bus
A device that connects components of a computer so that *data* can flow between them. There are several conventional buses that allow components made by different manufacturers to be used in the same computer.

Byte
One byte contains eight *bits*, enough to stand for one *character* of English, or one number. Thus, it generally takes more than one byte to make up a word. "Cat," for instance, requires three bytes.

CAI
Computer Assisted Instruction. A term applied to a wide range of instructional *software*, including drill-and-practice, simulation, and educational games.

Cartridge
A device that stores a prerecorded *program*. A cartridge is inserted into a special slot built into the computer. Also known as a solid state cartridge or *ROM* module.

Cassette tape recorder
Computer cassette recorders are usually the same as those used for audio recordings, but often need a special cable to connect them to the computer. They house and run magnetic tapes that either hold a prerecorded *program* or store *data* from the computer.

Character
A letter, number, or symbol.

Chip
A small (about the size of a child's fingernail) component that contains a large amount of electronic circuitry. Chips are the building blocks of a computer and perform various functions, such as doing arithmetic, serving as the computer's *memory*, or controlling other chips.

Command
An instruction that tells the computer to do something, such as to run a *program*.

Compatibility
The ability of different devices, such as a computer and a *printer*, to work together; or the ability of a particular *program* to run on a given computer. In short, the ability of anything in a computer system to work with anything else.

CP/M
Control Program for Microprocessors. A widely used *operating system* for microcomputers.

CPU
Central Processing Unit. The "heart" of a *microprocessor*, with components that control the interpretation and execution of instructions.

CRT
Cathode Ray Tube. A TV or TV-like *monitor* used to display information and pictures. Also called a computer screen.

Cursor
A symbol, usually a small square, that indicates where the next *character* will appear on the CRT screen.

Data
Information put into or taken out of a computer.

Data bank
A central location for storing vast amounts of information accessible by computer.

Data-base manager
A *program* that allows the user to enter, organize, sort, and retrieve information.

Disk
A magnetic device for storing information and *programs* accessible by a computer. A disk can be either a rigid platter (hard disk) or a sheet of flexible plastic (floppy diskette). Disks have tracks, much like grooves on LP records, where *data* is stored.

Disk drive
A device that *reads* information from a *disk* and copies it into the computer's *memory* so that it can be used by the computer, and that *writes* information from the computer's *memory* onto a *disk* so that it can be stored.

Documentation
The written instructions that explain how to use computer *hardware* or *software*. Also refers to all instructions and remarks, used to describe procedures when programming.

DOS
Disk Operating System. See *operating system*.

Downtime
Time when a computer is not working.

Electronic mail
The transmission of messages, documents, or other information from one computer user to another. This can be done over telephone lines using devices called *modems*.

Emulator
A *hardware/software* device designed to translate *programs* written for one particular computer so that they will run on another computer.

Firmware
Programs or *data* stored in *ROM*—either built-in by the manufacturer, or added with a cartridge—that cannot be changed by the user.

Flow chart
A diagram on paper that shows all the logical steps necessary to write a *program*.

Format
To prepare a *disk* so that it can receive and store information. Until you perform this task, the *disk* will not be able

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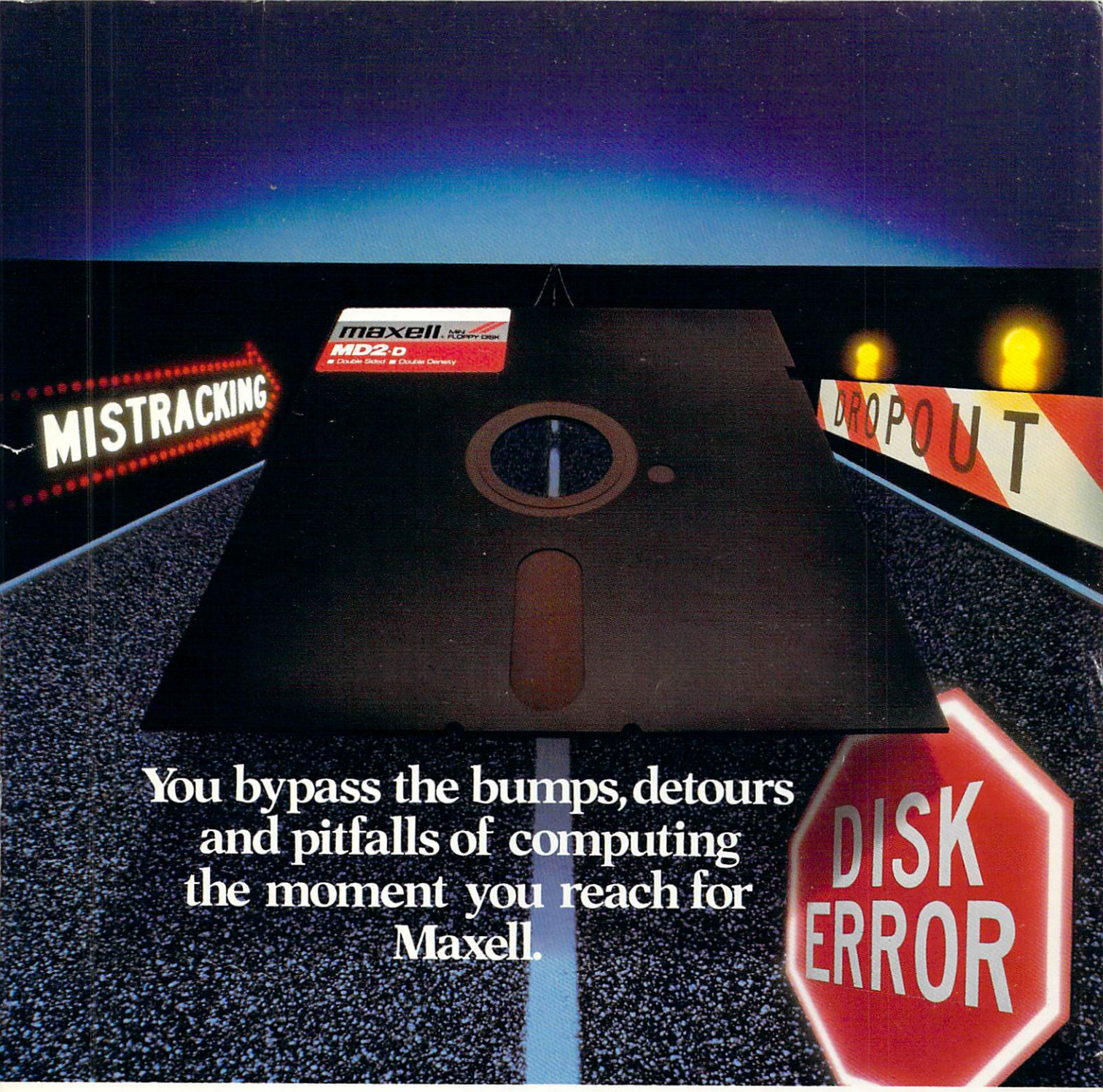

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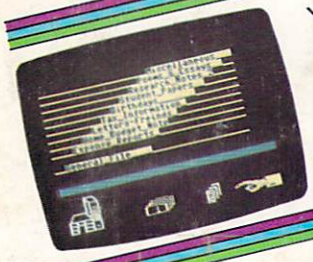

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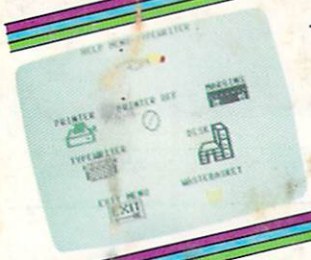

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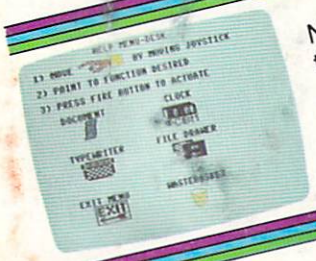

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